

Ethanol Development in Nebraska

1969-2019

*A history of ethanol in Nebraska, collaborated by
the Nebraska Ethanol Board*

Edited July 2025 – Ben Rhodes, Executive Director

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Executive Summary

The history of fuel ethanol development in the United States spans more than a century. Publications including “The Forbidden Fuel” and “Food For Thought” are among many that recount the evolution of ethanol fuel. Nebraskans played a role in many of these endeavors including the Chemurgy Movement of the 1930s and the marketing of Agrol, a blend of 10 percent ethanol and gasoline, during that same period. Nebraska legislators even enacted a 2 cent per gallon tax incentive in 1932 in an effort to support gasoline blends containing agriculturally-derived ethanol fuels.

Despite intense interest and commercial development of ethanol fuel and ethanol-powered vehicles and machinery, cheap and plentiful oil eventually overcame these initial efforts to sustain development of an ethanol industry. The oil industry’s opposition to agriculturally-derived ethanol has been a consistent factor in impeding this commercial sector’s growth.

The rich and interesting history of biofuels development is recounted in many publications and archives. An appendix to this historical project includes references to such materials. The focus of this account is specifically on the Nebraska ethanol development program’s first 50 years, from its inception in 1969 until 2019. This account intends to reflect key activities during a 50-year period that for the first time in history moved the concept of ethanol development to the economic reality it became by 2019. In 2014, an economic impact study showed the Nebraska Ethanol industry created \$5 billion in economic activity annually in the state. This is a success story by any measure, and is unique in that the catalyst for the Nebraska ethanol development program was a state agency established in 1971 by the Nebraska Legislature. The following account focuses on the unique role the Nebraska Ethanol Board played in fostering the development of the ethanol industry in the state.

THE BEGINNING

In 1969, a young farmer from Bellwood, Nebraska, began his first term in the Nebraska Legislature. Loran Schmit graduated from the University of Nebraska and farmed for most of his life. He gained a background in aviation and understood both machines and fuel. Although the difficult agriculture economy in the late 1960s influenced his interest in ethanol development, his concerns about the toxicity of lead in motor fuel served as the catalyst for his extensive involvement in ethanol development.



Sen. Loran Schmit in 1966. Courtesy of the Lincoln Journal-Star.

“During my first term in the legislature, the old-timer senators assured me that my ethanol suggestions were a good idea, but by the time I was ready to introduce a bill, the time for bill introduction had passed,” said Senator Loran Schmit (District 23, 1969-1993). “I came back in 1971 determined to do something to promote the use of ethanol from grain.”

Motivated by environmental and health concerns, Sen. Schmit sought a way to remove the lead in gasoline. He concluded that using ethanol to replace lead would be the best solution, as it would have no adverse effects on machinery, while simultaneously generating revenue streams for Nebraska farmers and reducing the toxicity of gasoline.

“At that time, no one had heard about unleaded gasoline, but I was convinced that there would be a time when we would have to take lead out of gasoline, and when we did it would lower the octane,” Sen. Schmit said. “I was also convinced that we could bring that octane level back up with the addition of ethanol. Although the oil companies insisted that they would never run short, we also knew there would one day be a shortage of fossil fuels.”

During his first years in the legislature, Sen. Schmit quickly learned the ropes working with rural and urban senators to move ethanol development legislation through the Unicameral system. He garnered support from the Nebraska Wheat Board—the only checkoff board in the state at the time—and the Nebraska Farmers Union. Additional support soon came from Omaha and Lincoln labor officials who understood that ethanol development could stimulate jobs for the Nebraska labor force.

Despite fierce resistance from the Petroleum Marketers Association and the American Petroleum Institute, Sen. Schmit pushed forward with Legislative Bill 776 to develop an ethanol industry in the state and a government organization to oversee it. In 1971, he was a lead sponsor of LB 776, which established the Agricultural Products Industrial Utilization Committee (APIUC), later named the Nebraska Ethanol Board (NEB).

As Sen. Schmit said when introducing LB 776 on the floor of the Nebraska Legislature on May 14, 1971, “This bill has five major purposes: first, to fund and carry out a program for the implementation and sale of grain alcohol gasoline in the state of Nebraska. Grain alcohol gasoline being a motor fuel, which has grain alcohol as an octane additive rather than lead. It is to be a replacement for tetraethyl lead in gasoline. The second purpose of the bill is to provide a temporary tax stimulus for grain alcohol gasolines to the extent of 3 cents a gallon in order to allow marketability to be fairly tested in the state of Nebraska. The third purpose of the bill is to demonstrate to the nation’s gasoline users that gasoline containing grain alcohol should have its place in the market as one of the additives for motor fuel, and thus to create a new market for the feed grains and the wheat raised in Nebraska. Number four is to demonstrate the octane benefit and toxicity-reducing effect of grain alcohol

gasoline versus leaded gasoline, thereby demonstrating that grain alcohol gasoline deserves strong consideration of both the public and private firms and agencies who are working to reduce the pollution caused by use of leaded gasoline. Number five is to create new jobs for Nebraska and a new industry which uses our farm commodities as a basis for their operations.”

On March 9, 1971, Sen. Schmit said LB 776 is to provide an incentive to the petroleum companies to remove the lead from gasoline and to replace it with a 10 percent blend of grain alcohol, in order to accomplish these three goals:

- 1.To provide a more pollution-free atmosphere
- 2.To provide a market for farm grains, which will encourage full production of agricultural products
- 3.To conserve our diminishing reserves of petroleum

Sen. Schmit is considered the grandfather of ethanol. He was the catalyst in Nebraska ethanol development, but he also credits senators with whom he served including Terry Carpenter, George Gerdes, Bill Waldo and Elmer Wallwey, who were strong supporters during initial legislative efforts.

Sen. Schmit recounts strong opposition to his proposals to enact legislation while trying to establish public policies to lay the foundation for ethanol development in Nebraska during his first term in the Legislature. Sen. Schmit recollects oil lobbyists and legislators consistently impeded progress and initially defeated his efforts in the legislative arena.

Speaking in support of the bill at the public hearing were representatives from the Southwest Research Institute and 11 agriculture organizations. Opposing groups providing testimony included the Nebraska Petroleum Council and Ethyl Corporation, the primary supplier of tetraethyl lead to gasoline refiners. The lines were clearly drawn.

AGRICULTURAL PRODUCTS INDUSTRIAL UTILIZATION COMMITTEE

To accomplish the goals laid out in LB 776, Sen. Schmit's bill proposed to create the Agricultural Products Industrial Utilization Committee (APIUC), a state government entity to "make continuing studies of existing and potential agricultural markets and methods, establish a procedure for entering ethanol into the blended fuel marketplace, and to do those things necessary to increase the marketability of Nebraska's agricultural grain sources." The committee was funded by one half of the one cent gas tax paid on fuels used for agricultural purposes and reported annually to the Legislature.

The bill established a seven-member board and charged the new state agency with a series of tasks related to ethanol development. The seven members included representatives engaged in farming, business and the petroleum industry. The statute also required three committee advisors, one each from the Department of Economic Development, the University of Nebraska, and the Department of Agriculture. Governor Jim Exon (1971-1979) appointed Ron Kelly (board member, 1971-1987), who worked at Alliance Tractor and Implement Company, as a business representative on the committee.

"The program was put together with the thought in mind that if we had enough alcohol plants in Nebraska, it would raise the price of corn," said Ron Kelly, who served on the board for 16 years. "We thought if we could get enough alcohol plants in Nebraska to produce 100 million gallons annually, we would have a successful program."

The first meeting of the APIUC was July 22, 1971, in the East Senate Hearing Room at the State Capitol Building. Early meeting minutes reflect a focus on matters of a practical nature including hiring an administrator, office location, budget authorization, accountability and designation of a technical advisor. As the board focused on pursuing legislative objectives like establishing incentives for ethanol production, members decided a demand for ethanol needed to be created through public awareness.

Initially, the APIUC received a small funding allocation, but the provision was in doubt due to questions regarding which government branch had jurisdiction over the funds. As written in statute, the Committee was appropriated \$40,000 from the general fund and 1/8 of 1 cent of the motor fuels tax for fiscal year 1971-1972.

“We were made out to be villains, who were stealing from the highway builders,” Ron Kelly said. “We were the poor relatives that never had a proper place to meet. I think in the beginning the Legislature just wished we would go away.”

The APIUC’s first executive director was Les Robinson, a former Nebraska senator who was supportive of the program in the Unicameral, and who worked without compensation. Besides the Committee’s Technical Advisor Dr. William “Bill” Scheller (1971-1996), Les Robinson was the only person on the board who had experience with alcohol fuel. Robinson’s father had worked to build the first ethanol plant in Nebraska during World War II to produce ethanol for the war effort. That plant was located at Ninth and Jones Streets in Omaha, and produced 90,000 gallons of ethanol per day.

Board members appointed by the governor and approved by the Legislature were active in politics and agriculture, and shared the vision of ethanol development in Nebraska. Loran Schmit recalls APIUC members as being politically savvy, influential in agricultural and political circles, and tireless in their advocacy efforts.

In a November 1972 report to the Legislative Council, APIUC members reported that the efforts of the committee have been directed toward several distinct, but related goals:

- A determination that a blend of gasoline and agricultural alcohol is technically and economically feasible and could possibly aid in pollution abatement.
- A limited advertising and public relations program in the belief that an informed public will continue to support our efforts to find additional uses for agricultural products.

By November 1972, the committee had held 15 meetings. Members were actively participating in research to prove ethanol as a viable fuel. The APIUC agreed to undertake a limited “consumer acceptance test” during the summer of 1975 at a cooperative in Holdrege, Nebraska. Board members worked with the cooperative association to source the ethanol and blend it for sale to consumers during a limited period. The initial reaction from consumers was positive, so the committee ordered additional supplies of the fuel blend and continued to gauge consumer response. This initial sales test reinforced to APIUC members and others that an ethanol-blended fuel could potentially be well-received by consumers. Additional testing of the fuel blend continued, including testing in committee vehicles. APIUC owned a Mazda car that used Gasohol, the tradename selected by the APIUC for a blend of 10% agricultural ethanol and gasoline. The Mazda was equipped with two small gas tanks in order to readily switch from Gasohol to regular fuel without

having to drain the tank. In 1976, APIUC purchased a yellow Ford Pinto to test the use of 10 percent ethanol gasoline blend.



The Ford Pinto Test Car

Two Nebraska State Patrol cars were also converted to run on anhydrous ethanol as a demonstration. The patrol vehicles were featured in radio and television public service announcements produced by the APIUC as part of an effort to illustrate performance of ethanol under demanding conditions.

In early 1980, the Ford Pinto was sent to Ford Motor Company in Detroit for examination after accumulating significant mileage. It was returned to the APIUC and later converted to an anhydrous ethanol fueling system. The Ford Pinto was eventually modified to run on a 99 percent ethanol blend. The APIUC gifted the Ford Pinto to Central Community College in Grand Island for use in ethanol research at a time when the college was providing research support for engines running on ethanol. The research included irrigation engines as well as automobiles. During this same period, the Nebraska Wheat Board and the APIUC collaborated on development and demonstration of an aspirated fuel system used in diesel equipment. The system was fueled by a dual tank fuel configuration that used ethanol in one tank and water in the other tank. Field tests were conducted in several locations in western Nebraska.

In early 1970s, the Committee's Technical Advisor Dr. William Scheller coined the term Gasohol, a blend of 10 percent anhydrous alcohol and 90 percent gasoline.

The Committee set to work to trademark both Gasohol and Gasahol, and in November 1974, the trade name Gasohol was registered with the Nebraska Secretary of State and in Sacramento County, California. Work continued to get it trademarked on a national level.

The APIUC reviewed and approved the use of the term by many parties nationwide, provided the use of the name met the definition described in the trade name.

The APIUC announced a contest requesting design ideas for the Gasohol logo. The winner of the contest offered a design that incorporated a reddish color to represent gasoline, white to represent ethanol, wheat heads to represent the agricultural origins of ethanol and yellow to represent corn. The original artwork is on file in the Nebraska Ethanol Board office.

The original gasohol logo is pictured right.



Based on the initial technical success of the ethanol fuel blend testing, Dr. Scheller, at the request of the Committee, designed and implemented the largest on-road test of ethanol-blended fuels undertaken in the U.S. The so called “Two-Million Mile Road Test” was launched in 1975 in cooperation with the NE Department of Roads. Three testing sites were established across Nebraska to take into account the impact of altitude, emissions, road performance and engine wear characteristics. A detailed account of this work has been published and distributed internationally due to the extensive work and excellent results. Vehicle engines showed less wear and reduced carbon buildup. Fuel mileage showed meaningful increases due to the higher octane rating of the ethanol blend. CO2 emissions registered lower with the ethanol blends during exhaust testing. This impressive body of technical data was an important demonstration of vehicle performance. The data was requested by automakers around the world, and the results were the basis for the fuel waiver soon thereafter requested of the Environmental Protection Agency (EPA).

In June 1978, “Gas Plus, Inc.” applied to the EPA for a waiver of Gasohol, a blend of 90 percent unleaded gasoline and 10 percent ethanol. As a state agency, the committee could not be the applicant of record with the EPA for a new fuel under the Clean Air Act’s “substantially similar” review process. The committee recruited Jim Lustgarten, a young service station entrepreneur with Gasohol Plus, as the

commercial party requesting the review and approval for 10 percent ethanol blends to be allowed for commercial sale nationally.

On Sept. 6, 1978, the EPA convened a hearing in Chicago on waiver requests for Gasohol, MTBE (methyl tertiary butyl ether) and TBA (tertiary butyl alcohol). Dr. William Scheller provided all the technical data to support the Gasohol application. On Dec. 16, 1978, the EPA waiver was granted on the basis that Gasohol was “substantially similar” to gasoline and therefore legal to sell. The EPA did not formally act to approve the fuel, but under regulations in effect at the time, the action constituted a de facto approval by which the waiver could be applied. Prior to the waiver, Gasohol was not approved for commercial sale, and could only be sold or used in limited geographic areas under a special permit provided by the EPA. This landmark action, spearheaded by Nebraskans, created the opportunity to expand Gasohol sales nationally.

The APIUC began commercial advertising, Gasohol promotions and consumer education in earnest and worked with automakers to convince them, beginning in model year 1979/1980, to warrant the use of 10 percent ethanol fuel blends. In February 1978, Gasohol was first offered at an independent service station in Lincoln, Nebraska. By July 1979, AMOCO was the first major oil company to begin marketing Gasohol.

One of the early marketing tools was a partial exemption from the federal excise tax on gasoline. The state then followed with a series of tax exemptions from the state motor fuel tax. Those exemptions helped make Gasohol more marketable and enhanced the economic feasibility of the program.

In 1972, the Nebraska Legislature reduced the state gasoline excise tax exemption for Gasohol. LB 776 was updated during the 1972 legislative session with LB 1208, which established a reduction of 3 cents per gallon in the state gasoline tax for “gasoline sold in Nebraska, which contains a minimum 10 percent blend of agricultural ethyl alcohol of at least 190 proof.”

The Legislature also established an agricultural alcohol fuel tax fund (AAFTF) to provide a program for implementation of a Nebraska agricultural alcohol industry for automotive fuels. The monies for this fund were derived by retaining 1/8 of a cent per gallon of the refundable portion of the state gasoline tax resulting from non-highway usage of gasoline in the state.

The first oil crisis of the 1970s was becoming more intense and by October 1973, OPEC raised the price of oil from \$5.12 to \$11.65 per barrel. President Richard Nixon wasted no time and on Nov. 7, 1973, he announced Project Independence—a concept to free the U.S. of its dependence on all foreign oil imports by 1980. Soon after the announcement, Arab OPEC members initiated an oil boycott of the U.S. in retaliation of the U.S. support of Israel in the 1973 Middle East war. Despite Nixon's efforts, he failed to prevent the increase in American oil consumption after the 1973 – 1974 oil embargo. Dependence on foreign oil suppliers rose from 36 percent to almost 50 percent in 1979.

In 1977, it was clear the federal government was ready to support alternative sources of energy. In May, the Food and Agriculture Act of 1977 (Farm Bill) was passed, providing loan guarantees by the USDA of up to \$15 million for each of four pilot projects to make alcohol or industrial hydrocarbons from renewable resources. This was the first federal government incentive for alcohol plant construction. The 1977 EPA Clean Air Act Amendments passed in August, and included the introduction of the concept of “substantially similar” to be applied to unleaded gasolines. In November, the U.S. Senate Republican Conference, a congressional research arm of the Republican Party, released an optimistic report on the economics of producing ethanol from grain. Nebraska U.S. Senator Carl Curtis (1955 – 1979) commissioned the report and recommended that the nation move rapidly ahead to develop a national alcohol fuels industry.

The Energy Policy Act of 1978 enacted the first federal tax incentive for ethanol—a 40 cent per gallon exemption for ethanol from federal excise taxes on motor fuel. Signed into law in November, the Act provided incentives for production of non-fossil alcohol fuels, and exempted federal motor fuel excise taxes on gasoline containing 10 percent alcohol not derived from petroleum, natural gas or coal.

The APIUC also played a crucial role in fuel security issues. In May 1979, personnel with the Department of Defense from Fort Belvoir, Virginia, met in Lincoln to review ethanol tests, potential production, and analyze the use of ethanol as a domestic source of liquid transportation fuel.

On June 28, 1979, the AAA Gasohol Giveaway was held in Washington, D.C., and 35 senators and congressmen filled their cars with Gasohol provided by AAA. Todd Sneller (Administrator of the APIUC and its successor organizations, including the NEB, from 1979 – 2018) drove the ethanol-powered Ford Pinto from Nebraska to Washington, D.C., to participate in “Gasohol Day on Capitol Hill.” He made stops across the Midwest, talking to media and using the Ford Pinto to promote Gasohol.

With so much buzz on the national level, APIUC members took advantage and hosted the Nebraska Midwest Regional Gasohol Conference in Lincoln on Nov. 1-2, 1977. A conference session on legislative matters resulted in groundwork for creation of the National Gasohol Commission, which was established during a conference hosted in Lincoln in August 1978. Gasohol began to spread nationally, and in December 1978, a Springfield, Illinois, service station started selling Gasohol followed by several others spurred by state participants in the National Gasohol Commission.

The National Gasohol Commission, initially headquartered in Lincoln and chaired by APIUC member Holly Hodge, met in Chicago Nov. 12-14, 1978, with representatives from 33 states and four foreign countries attending. The national group was gaining momentum. At a meeting in Denver in March 1979, members resolved that every state contribute a minimum of \$5,000 in order to be an officially accepted member of the commission.

“We held a seminar and we invited people from every state to come to our Gasohol seminar, and we were amazed at the response we got,” said APIUC member Ron Kelly. “As a result of that, we formed an entity called the National Gasohol Commission. We came up with \$20,000 to get it going and with the hopes that the other states that were members would eventually come up with some money. That proved not to be the case, unfortunately, and ultimately, it died. But it still helped get the word spread out over all the states.”

It was evident that for ethanol to become a national fuel it would require a diligent national lobbying effort. The APIUC was active in Washington, D.C., but it was clear that to be effective the ethanol movement should have a regular presence in Washington. At the November 1981 National Gasohol Commission meeting, Congressman Berkley Bedell (D-Iowa, 1975-1987) met with delegates, including Todd Sneller and Steve Sorum (APIUC and its successor organizations’ project manager, 1978-2017), to propose collaboration on a Washington-based ethanol advocacy effort. Rep. Berkley brought his staff member, David Hallberg (NEB board member, 1998-2009), who had been instrumental in drafting and advocating national ethanol policy efforts. Hallberg met with APIUC representatives to discuss a transition of efforts from Lincoln to Washington, D.C. Hallberg subsequently founded the Renewable Fuels Association (RFA) and asked the APIUC to join in a concerted, Washington-based lobbying effort. By 1984, the transition of a unified lobbying effort was completed and the National Gasohol Commission was subsequently disbanded.

During the early 1990s, after leaving the RFA, David Hallberg became an international ethanol advisor and relocated from Washington, D.C. to Omaha, NE. He served as a business representative on the Nebraska Ethanol Board for several years.

DR. WILLIAM SCHELLER, TECHNICAL ADVISOR (1971-1996)

The following information on Dr. William Scheller is cited to the Scheller Archives at the University of Nebraska-Lincoln. The Gasohol Committee provided funding for the establishment of archives at UNL to preserve Dr. William Scheller's work.

The APIUC legislation also called for appointment of a technical advisor to the board. Dr. William Scheller (1971-1996), newly recruited to the University of Nebraska-Lincoln and serving as chair of the Department of Chemical Engineering, moved to Nebraska from California where he worked in the oil refining industry. Dr. Scheller was by all accounts a brilliant chemical engineer, who clearly understood the role of lead in gasoline. He also understood the toxicity of lead and other gasoline compounds including aromatic compounds. Dr. Scheller became aware of the ethanol development program and expressed to Sen. Loran Schmit his interest in serving as technical advisor. His extensive experience and technical credentials would prove to be of critical importance as the APIUC evolved.

“We [ethanol supporters] were frequently ridiculed as being somewhat radical. Bill Scheller's support was critically important to us because he gave us the technical experience and the professional background that gave us credibility,” Sen. Schmit said. “Without that, we wouldn't have been able to make the progress we did.”



Dr. William Scheller (left) with Les Robinson and Sen. Loran Schmit circa 1975.

In 1972, Dr. Scheller coined and registered the trade name Gasohol, a blend he described as 10 percent agriculturally-derived ethanol and 90 percent unleaded gasoline. Soon after, he began work on the 2 Million-Mile Road Test, the first and most credible ethanol fleet test using Nebraska-owned vehicles to compare the performance of unleaded gasoline with Gasohol. The test proved Gasohol performance was more than satisfactory under all conditions and cleared the way for widespread use.

In response to criticism from petroleum interests, Dr. Scheller analyzed the energy balances for ethanol including grain production, ethanol production and by-product feed production. Eventually, the U.S. Department of Energy adopted the results of these analyses as policy. In the drive to obtain ethanol's entry to the marketplace, he presented testimony before many state and federal agencies and in 1979, the EPA approved an application prepared by Dr. Scheller that allowed Gasohol to be marketed across the country.

Among his many contributions to the ethanol industry, Dr. Scheller developed a process for extracting protein from distillers grain, the primary co-product of dry mill ethanol plants. He designed the first ethanol-electricity co-generation system that increased the efficiency of both processes. Dr. Scheller conducted research on acid and enzymatic hydrolysis of various biomass materials, and prepared experimental and economic studies identifying optimum process conditions for the dehydration of ethanol using molecular sieves. Later in his career, Dr. Scheller prepared mathematical models for the prediction of the equilibrium composition of ethyl tert-butyl ether (ETBE), and defined the fermentation efficiency of the bacterium *Zymomonas mobilis*, used to synthesize alcohol from different sugars.

Dr. Scheller performed much of the early development and testing work prior to the reintroduction of ethanol to the marketplace in the mid-1970s. He was instrumental in guiding the fledgling Gasohol product through regulatory mazes and invented refinements to the manufacturing process of ethanol and co-products. The significance of Dr. Scheller's role in the development of the ethanol industry is well documented. His work is recognized worldwide, and his advice and counsel were in great demand for more than two decades.

Dr. Scheller died Nov. 30, 1996, after a short battle with cancer. Dr. James Hendrix (technical advisor, 2002-2014), Todd Sneller and Steve Sorum served as pallbearers at the funeral. As a leading expert in the field of ethanol-based fuels, Dr. Scheller provided consultation to organizations worldwide. His clients included several agencies of the U.S. government, the United Nations, Thailand and Brazil. He consulted for Fortune 500 companies in the U.S. as well as Volkswagen and other companies abroad. At the time of his death, ethanol fuel was an integral component of the U.S. fuel mix. Credit for this success is shared by many people but special recognition is due to one of the true founders of the industry, Dr. William Scheller.

"Scheller was the unsurpassed technical expert, and in the face of constant attacks by the oil industry continued to provide technical credibility and expertise

that fostered development of ethanol production and use at a critical juncture in the evolution of this renewable fuel,” Sen. Loran Schmit said.

THE 2 MILLION-MILE GASOHOL ROAD TEST PROGRAM

Although the oil embargos of the 1970s caught the attention of Congress, APIUC Member Ron Kelly noted that following Dr. William Scheller’s advice to set up the 2 Million-Mile Road Test was the smartest thing members did.

The 2 Million-Mile Road Test was the Committee’s first major foray into scientifically proving that ethanol was a superior fuel. The purpose of the project was to:

1. Establish the quantitative effect on fuel consumption of the addition of sufficient anhydrous ethanol to produce a 10 percent solution by volume with unleaded gasoline meeting specifications for sale after June 30, 1974.
2. Establish the quantitative effect of this ethanol addition on cylinder wear and exhaust gas composition.
3. Establish the qualitative effect of this ethanol addition on engine valves, spark plugs and exhaust systems.

In addition, the study also monitored drivers’ comments and overall perception of vehicle performance while using the ethanol fuel blend.

“Initially, our biggest problem was to prove that ethanol was a viable fuel,” Ron Kelly said. “Our enemies were saying that if you put alcohol in gasoline it would dissolve plastics and ruin fuel lines. So to negate that, we embarked on the 2 Million-Mile Road Test.”

Phase I: in the preliminary test, five vehicles were used including:

- Two 1972 Plymouth Furys with V8 engines
- Two Dodge half-ton pickup trucks with V6 engines
- One Mazda automobile with a Wankel engine to examine wear in a rotary engine.

The pickups were Nebraska highway emergency pickups and were selected because they accumulated mileage at the rate of 100,000 miles per year, approximately what an ordinary motorist would get in five years. The test also included three vehicle teardowns and inspection sites provided by the Nebraska Department of Roads at locations in Nebraska that varied in altitude from 600 feet

above sea level to more than 5,300 feet above sea level.

Phase II: included 40-50 state fleet vehicles to gather mass information on ordinary problems a motorist might encounter—cold weather stability, excessive motor wear, vapor lock, water accumulation, muffler deterioration and storage problems. Records were kept on miles traveled, fuel used, problems encountered, if any, and the motors were periodically examined for wear. Control vehicles using regular gasoline and the same type of service allowed for comparison of mileage and wear.

Phase III: expanded on the second phase with an additional 35-40 state fleet vehicles.

Dr. William Scheller worked with Jim Lustgarten, a young entrepreneur, to provide fuel at two Nebraska retail stations—Waco and Lincoln—known as Lustgarten’s “Gasohol Plus” stations. The fuel used in the preliminary road test was 90 percent lead-free gasoline and 10 percent anhydrous ethanol. The road test accumulated approximately 2.2 million on-road miles between 1975 and 1978, and concluded that gasoline mixed with 10 percent ethanol performs as well as gasoline without ethanol and has “certain desirable properties when blended with unleaded gasoline.”

Since the production of grain and its fermentation are less closely coupled to the price of crude oil than the price of gasoline, it further appeared that grain alcohol would become more attractive as an automotive fuel additive as the price of gasoline and crude oil continued to rise.

Since there is no shortage of starch in the world, and since the use of co-product cattle feed from grain alcohol manufacture results in increased weight gain in cattle over that obtained with whole grain, the production of alcohol from grain does not remove needed food from the marketplace. Furthermore, since more ethanol can be made from low-quality grains unsuitable for human or animal consumption, and since the co-product cattle feed is suitable for use, even more new protein can be introduced into the marketplace for human consumption.

In other words, inexpensive grain can be fermented and consistently used as a fuel additive without any loss to the food or feed market—and as prices for grain are independent of oil, the cost of ethanol-blended fuel should remain low as oil prices rise.

Interestingly, the study also concluded that “since grain supplies are not adequate to provide for the production of sufficient grain alcohol to blend 10 percent in all gasoline in the United States, it is concluded that the Gasohol program is a regional program, which will find applications in grain-producing areas of our nation.” As of 2018, gasoline blended with 10 percent ethanol accounted for 97 percent of the total motor fuel consumption in the U.S.

The testing objective was to find and overcome the ordinary difficulties, if any, that the average motorist would encounter if he or she were to drive into a filling station and order the vehicle filled with an alcohol-blend gasoline. The Midwest Research Institute of Kansas City wrote and supervised the technical aspect of the testing program, and the University of Nebraska-Lincoln College of Engineering provided the statistical evaluation. Designed and implemented with the cooperation of the Nebraska Department of Roads and the support of Governor Jim Exon (1971-1979), the test program took three years to complete and showed Gasohol to be a superior fuel to gasoline in all aspects of performance.

DISTILLERS GRAIN RESEARCH

Outside of fuel, the APIUC also funded research on ethanol co-products at the University of Nebraska-Lincoln.

Research on distillers feed protein isolates by Dr. Satterlee, et al., was important in that it demonstrated the protein in grain was still available to be used as a food source. Of equal or greater importance was the innovative work of Dr. Terry Klopfenstein, professor of ruminant nutrition, who was a pioneer in the area of bypass protein in ruminant animal feeding. Klopfenstein’s work took many years to be fully understood and appreciated. Today, he is recognized as a national pioneer in ruminant feed practices that incorporate distillers grains.

Other research included methane as a fuel source for ethanol production, ETBE, a patented lactose and corn co-fermentation process, and ethanol engine and fuel research conducted in part at the Tractor Test Lab on the University of Nebraska-Lincoln’s East Campus.

CONSUMER ACCEPTANCE OF GASOHOL

Once the APIUC proved that Gasohol would run efficiently in vehicles with the 2 Million-Mile Road Test, they had to prove consumers would buy the product. The committee felt no company would make an investment to sell the product unless they were assured of continuous marketing. As money became available, the committee created a public relations program that would lead to preliminary market research and market penetration for the ethanol fuel blend.

In 1974, Dr. Scheller began another study: “The Holdrege Gasohol consumer acceptance test and marketing survey report.” Starting in June 1975, consumers in Holdrege, Nebraska, were able to purchase ethanol-blended fuel—the first time it was available in the country since the 1930s.

The Holdrege Cooperative Association’s service station received 20,000 gallons of Gasohol to sell during one year, with surveys from consumers taken and catalogued throughout the year. The APIUC underestimated the demand for ethanol-blended gasoline, and the 20,000-gallon allotment sold within the first two weeks of June.

The service station received an additional 63,000 gallons of Gasohol, which sold by the end of August. Consumers purchased 93,000 gallons of the product in just 11 weeks. Only three months into the experiment, the research team deemed there was enough information to end the study and determine conclusions. The committee concluded from these results that a successful market for Gasohol existed in Nebraska.

The results found that Gasohol was most likely to be purchased by individuals aged 45-64 who were occupied in farming or ranching. It is also worth noting that only 51.7 percent of respondents stated that the Holdrege Cooperative Association’s service station was their “regular” place to purchase fuel, indicating that nearly half of the respondents went out of their way specifically to get ethanol-blended fuel.

As for how the consumers felt about their vehicle’s performance with Gasohol, the study concluded: “In response to the statement, ‘My vehicle performed better with Gasohol than with previously used gasoline,’ the majority of the survey respondents (57.2 percent) either strongly agreed or agreed. ... 32.4 percent were undecided, while those disagreeing and strongly disagreeing represented 5.5 percent and 0.7 percent respectively.”

Additionally, “almost 70 percent of the survey respondents either strongly agreed or agreed with the statement, ‘I would use Gasohol exclusively in my vehicle if it continued to be commercially available.’”

Perhaps most surprising, the Gasohol in the study was priced the same as ethanol-free gasoline, which did not deter sales. When responding to the statement, “I would be willing to pay 2 cents per gallon more for Gasohol over regular or unleaded gasoline,” more than 43 percent of the survey respondents either strongly agreed or agreed, and 29 percent were undecided when asked to react to the statement.

Finally, almost 90 percent of survey respondents replied strongly agree or agree to the statement, “I believe the state should encourage the use of Gasohol through a lower gasoline tax on Gasohol to make the price equal with gasoline of equivalent quality.”

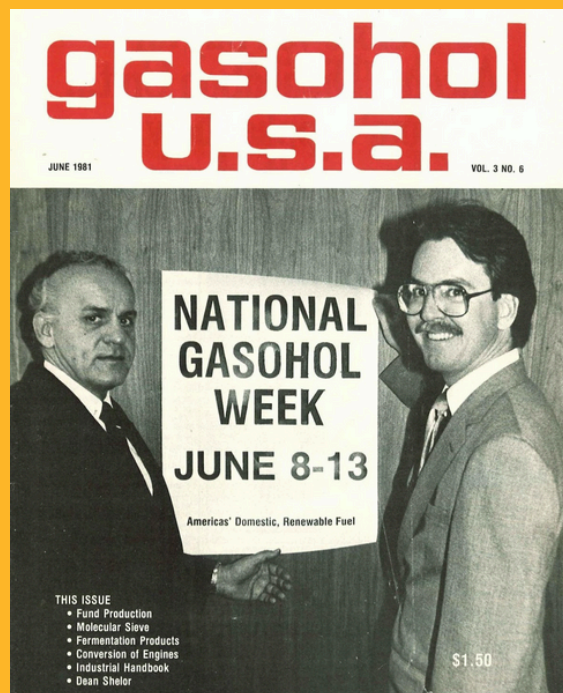
In 1979, Milton “Bus” Whitehead was appointed to the APIUC. Whitehead was a prominent Phillips 66 fuel wholesaler and marketer in the Lincoln area. After seeing the success of the Holdrege marketing test, Whitehead was willing to start selling Gasohol at his stations. Whitehead was among the first Nebraska fuel marketers to greatly expand Gasohol availability in the Lincoln market. By using ethanol to expand the fuel supply, Whitehead was able to participate in a national fuel allocation program during the 1979 oil crisis. This allowed him to qualify for increased gasoline supplies—an increased “allocation” under the federal program—during the 1979 period. Whitehead Oil Company continued to sell ethanol blends, including E85, even after his period of service to the Nebraska Ethanol Board.

The 1980s opened on a positive note for ethanol.

On Jan. 11, 1980, President Jimmy Carter announced a new alcohol fuel program, which set a national goal of 300 million gallons per year of ethanol production capacity by the end of 1981. In June 1980, the Energy Security Act was passed with a goal of displacing 10 percent of gasoline with alcohol by 1990. By July 1980, 25 states had exempted Gasohol from all or part of their state gasoline excise taxes.

Politicians continued to support the development of cleaner-burning, domestically-produced fuels. In the summer of 1980, Nebraska Governor Charles Thone (1979-1982) issued an executive order that state fleet vehicles would use Gasohol exclusively. Just before exiting the White House, President Jimmy Carter issued an executive order requiring the use of Gasohol in U.S. government vehicles commencing Jan. 5, 1981.

Governor Charles Thone (left), with NEB Administrator Todd Sneller, proclaims June 8-13, 1981, as Alcohol Fuels Week, which was observed as a means of recognizing the role alcohol fuels can serve in meeting liquid fuel needs in Nebraska. Similar promotional activities and proclamations were made by several governors in many states throughout the country.



Perhaps the true test of ethanol's success was the frustration of oil companies, as they searched for ways to edge out their alcohol competition.

In January 1980, Exxon notified the New Jersey Dealers Association that Gasohol sales could not be charged using Exxon credit cards, and Exxon dealers' franchises would be canceled if they used Exxon pumps to dispense Gasohol. Phillips 66 adopted similar practices with their retailers. This prompted a probe by the U.S. Senate Antitrust Subcommittee to determine whether Big Oil's efforts represented unfair restraint of trade. Rep. Virginia Smith (Nebraska District 3, 1975-1991) was crucial in resolving this issue. One of Smith's aides, Randy Moody, moved to Lincoln in 1980 to serve as chief of staff to Gov. Charles Thone, which helped ensure a good working relationship at the state and national level by Nebraska policymakers. Ethanol supporters received a big win when the Gasohol Competition Act of 1980 barred major retailers from preventing a retail dealer from selling ethanol and from using a major card for those sales.

"The oil companies didn't want to give over any of their business to farmers, so they conceived the idea of not being able to charge the blended fuels on their credit cards," Sen. Schmit said. "Of course, these things happened without the public knowing what was going on until they pulled into the station and tried to use their gasoline credit card, and it wasn't available."

During an appropriations committee hearing in 1980, Chair of the Committee Sen. Shirley Marsh (District 29, 1973-1989) suggested to Todd Sneller during his testimony that the APIUC name was too long. In February 1981, with LB 80, the board offered Nebraska Gasohol Committee as an option and it was formalized in statute. A similar process later changed the name to the Nebraska Ethanol Board. Staff also encouraged the addition of agency responsibilities during the name changes. When changes occurred, they included a focus on cleaner-burning fuels and work with national clean fuels organizations.

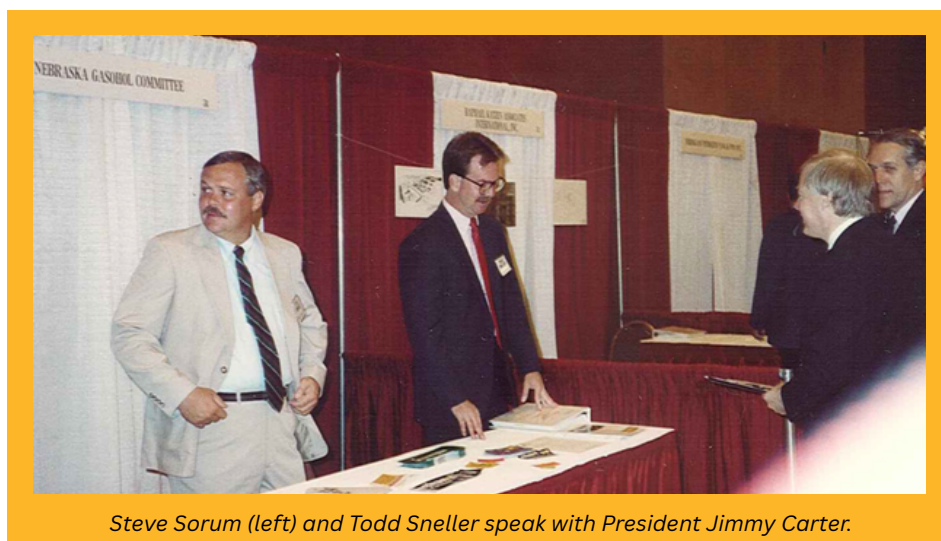
By 1984, Nebraska was second nationally in per capita use of Gasohol, with ethanol blends sold in 28 percent of Nebraska's gasoline stations. Just four years later, Nebraska took the lead nationally in sales of ethanol, exceeding 280 million gallons of ethanol-blended gasoline, or approximately 1 in 3 gallons of gasoline sold in the state contained ethanol.

"With the exception of one year (1986), we've seen a 5-7 percent increase in Gasohol sales in Nebraska every year for the past 10 years," said Steve Sorum in a December 1989 interview with Nebraska Farmer magazine.

Sorum noted the 1986 decrease in sales was due to AMOCO, the state's largest seller of gasoline, discontinuing the sale of Gasohol and coming out with a higher-octane gasoline called Ultimate. AMOCO later reinstituted ethanol fuel sales for competitive purposes.

Nationwide, in 1988, more than 340 million bushels of corn were used to produce ethanol for the 10 percent blend market, and more than 8.4 billion gallons of Gasohol were sold in 42 states. By 1989, ethanol was available at nearly 700 stations across Nebraska with approximately 43 percent of the gasoline in the Omaha area containing ethanol, while only 17 percent of the gasoline sold in the Panhandle area contained ethanol.

On July 4, 1982, Nebraska hosted the Independence Day Alternative Fuels Classic, which involved 30 vehicles from 20 states. The classic covered 150 miles from Lincoln through Seward, York and Aurora and back to Lincoln with vehicles powered by non-petroleum fuel. Sponsored by the Nebraska Energy Office and the Nebraska Gasohol Committee, the Alternative Fuels Classic was hosted in conjunction with the Energy Independence Fair at Lincoln's Pershing Auditorium. The pace car was a pure-alcohol fueled Ford Pinto, owned by the Nebraska Gasohol Committee. Todd Sneller and Steve Sorum dispensed ethanol fuel for the competition, and talked to drivers about the performance of ethanol fuel.



General Motors first approved 10 percent ethanol blends in 1979 model year vehicles. Ford quickly followed and Chrysler followed by 1981. The importance of this warranty inclusion was essential to the marketing point that vehicles were approved to use Gasohol.

By 1989, a campaign was underway to urge consumers to use higher blends of

ethanol in flex fuel vehicles. The first of these were methanol-based fuels sold in California. Midwest states urged automakers to offer equivalent flex fuel vehicles using blends of 85 percent ethanol. The first of the ethanol versions were Chevy Lumina's, and the State of Nebraska acquired five in the first fleet purchase. By 1991, Nebraska began integrating more flex fuel vehicles, including the Ford Taurus. The Nebraska Gasohol Committee worked with automakers to expand adoption. Ford and General Motors tasked Todd Sneller and Doug Durante, director of the Clean Fuels Development Coalition, to meet with state fleet managers, including those in Arizona and Colorado where they were battling serious pollution problems. A key marketing point was reducing carbon monoxide by using ethanol blends in polluted areas. The Nebraska Gasohol Committee hosted many "mechanics seminars," which were typically conducted in cooperation with local auto dealerships and community colleges.

Leaded gasoline, which accounted for approximately half of all gasoline being sold in 1985, was starting to be phased out by the EPA. By January 1986, gasoline lead content was reduced to 0.1 gram per gallon. The lead phaseout represented an enormous market for ethanol as an octane enhancer, perhaps doubling the ethanol market within two to three years. Up until 1985, ethanol was considered a fuel extender and now was quickly being marketed as an octane enhancer.

Tax incentives also favored dealers who sold ethanol blends at their service stations. The federal excise tax incentive increased from 5 to 6 cents on Jan. 1, 1985. When added to Nebraska's 5 cent state motor fuel tax incentive, this increase meant dealers received a net advantage of 11 cents on each gallon of ethanol purchased. Blending ethanol became more attractive financially and helped maintain margins as oil prices continued to drop.

In the mid-1980s, anti-Gasohol campaigns by oil companies began to take a toll on ethanol sales. It was determined by the Nebraska Gasohol Committee that a new name was likely to better identify the fuel and its octane benefits. Beginning in 1985, lead was phased out in U.S. fuel, which allowed marketing to focus on ethanol as an octane enhancer. Conventional 87-octane gasoline became "super" by adding 10 percent ethanol to increase the octane to 89, while lowering the price of the fuel. This theme was used in countless racing promotions across Nebraska and the country.

Taking advantage of the tax incentives and the new octane market, the Nebraska Gasohol Committee transitioned from branding the 10 percent ethanol blend as Gasohol to calling it Super Unleaded. A new logo and promotions were rolled out

in July 1985.

By statute, the Nebraska Gasohol Committee allocated money for three purposes: research, promotion (including market development and public education) and assistance to private industries wanting to construct an ethanol plant. Administrator Todd Sneller said this included helping recruit and inform prospective developers about, among other things, Nebraska's business climate and the state's ethanol market.

However, the Gasohol Committee's primary focus had been research and promotion, which included the 2 Million-Mile Road Test and use of ethanol co-products for added-value agriculture. The committee funded many ethanol promotion projects, including seminars for auto mechanics and dealers, TV and radio promotions and other efforts. In 1978, the state used 78,000 gallons of ethanol, and in 1989 the state was projected to use more than 300 million gallons, which Sneller considered a measure of the Nebraska Gasohol Committee's success.

Once the fuel was validated and widely accepted by consumers, there was pressure to change focus. This time it was on developing the state's own ethanol industry. It was a process likened to the "chicken or the egg" debate. The Nebraska Gasohol Committee was trying to develop a market for which there was no—or extremely limited—product.

During the 1985 legislative session, Sen. Tom Vickers introduced LB 456 to eliminate commodity boards for wheat, soybeans, poultry and eggs, corn, grain sorghum and beef as well as the Nebraska Gasohol Committee; and Sen. Rex Haberman introduced LB 444 to eliminate the state's mandatory beef checkoff system. Sen. Vickers said he questioned whether the boards, established to develop markets for Nebraska farm products, had been effective.

"Gasohol has been sold as a wonderful way to sell more corn," said Sen. Vickers in a Feb. 21, 1985, Unicameral Agriculture Committee hearing. "A wonderful way to promote a product and to lower the dependence of this nation on foreign nations for energy, but I suggest that as a corn producer out there, it's not going to do him any good unless he gets more money for his corn. The simple fact that there's a gasohol plant in Hastings, Nebraska, that was dedicated last week is not necessarily, in my opinion, going to raise the price of corn for that farmer in Hastings."

The Nebraska Gasohol Committee's success started to be measured in "bricks and mortar" or the actual construction of ethanol production plants. Sen. Loran Schmit, sponsor of the legislation creating the Gasohol Committee, believed ethanol had been studied enough. Sen. Schmit was frustrated that after years of promotion and research, Nebraska had not built more production plants. That frustration, shared by others, was one of the major issues facing Nebraska ethanol advocates by the early 1990s.

Between 1979 and 1989, several small Nebraska commercial ethanol operations started and failed, primarily due to economics of smaller plants and market fluctuations in fuel and corn prices. Plants in Ainsworth, Bertrand, Clay Center, Fairfield, Lindsay, Springfield and Venango all rated to produce less than 1 million gallons per year, started but by December 1989 all had been closed.

In a December 1989 interview with Nebraska Farmer, Sneller conceded that the industry recruitment role has been frustrating. "Factors out of our control, including the argument from potential developers that Nebraska's population is too limited, have not allowed us to assist in plant construction as well as we would have liked," Sneller said.

Through the years, the Nebraska Gasohol Committee tried to become more directly involved in plant construction. A bill passed in the late 1970s to increase the state gasoline tax with revenues earmarked for an Alcohol Plant Construction Fund, but the Nebraska Supreme Court ruled the state "could not directly extend credit to private sector parties" for ethanol plant construction. Other attempts at establishing plants were also unsuccessful and frustration grew, so in 1986 the 11-member Nebraska Ethanol Authority and Development Board (NEADB) was established.

LB 1230, introduced by Sen. Loran Schmit, created the NEADB and its cash fund for "providing equity financing for the construction of ethanol production and distribution facilities." The bill also levied a 1½ cents excise tax from July 1, 1986, to Jan. 1, 1988, on all Nebraska wheat, corn and grain sorghum marketed between the fall harvest 1986 up to and including the fall harvest 1987. Ultimately, the incentive program netted approximately \$17 million. The NEADB was administered by the Nebraska Gasohol Committee. The Gasohol Committee was charged with research and promoting the use of ethanol, while the NEADB's primary function was to focus on establishing ethanol production.

The 11-member NEADB included the seven Nebraska Gasohol Committee members, plus one representative each from wheat, corn and sorghum production and from the state's public power industry.

In appointing NEADB members, the focus was on Nebraskans with business experience. One of Gov. Kay Orr's appointments was Howard Buffett, son of billionaire Warren Buffett. Howard Buffett was a Douglas County Commissioner, and owned and operated a 406-acre farm in Burt County.

Howard Buffett was well connected to Nebraska politicians and business representatives, and worked with Gov. Kay Orr to recruit several key business leaders to serve on the NEADB. As a county commissioner, he worked with the Governor to get county boards, including Douglas County, to follow the State's example of requiring the use of ethanol fuels in fleet vehicles. He served as board chairman and was proactive in efforts to expand market development efforts and ethanol financing opportunities.

In 1987, Sen. Schmit introduced LB 279, which expanded and clarified the authority of the NEADB to make investments in ethanol projects. The Board could loan or grant funds to communities to help construct community-owned ethanol plants.

"The Board, as a state body, cannot itself directly provide loans or grants to the private sector nor can it do the same indirectly through communities to the private sector," said Sneller, viewing this approach as limited. "The communities have to own the plants themselves."

Another LB 1230 amendment allowed the Board to spend up to \$3 million on ethanol research. By December 1989, the Board's only investment was the purchase of 49 percent stock (\$490,000) in American Eagle Fuels which owned an ETBE plant near Eagle, Nebraska.

The Board's investment funds swelled to \$20 million, but the board members listened to a series of unconvincing investment pitches from dozens of prospects.

"Many of those people were enamored with the concept of building an ethanol plant," Sneller said. "But they were often ill-equipped for executing that concept."

The Board continued to be criticized for not moving fast enough in plant construction and investment. During the 1989 legislative session, Sen. Rex Haberman sponsored a bill to return the checkoff money back to farmers. Sen.

Haberman eventually withdrew the bill, but even Sen. Schmit talked of enacting similar legislation if the board failed to act.

“The board is caught between two arguments: pressure to spend the money and the goal of the board to be accountable for money spent,” Sneller said.

With the state and federal tax incentives set to expire in a few years—a 3-cent-a-gallon state exemption to expire December 1992, and 6-cent-a-gallon federal exemption to expire September 1993—it was likely no new ethanol plants would be built without some assurance that the exemptions would be extended.

“Developers in the past have been hesitant to make long-range plans to build large plants because of the uncertainty over the tax credit extension,” said Matt Connealy (board member, 1986-1989). “There will be new plants built when we get that extension. I am frustrated with the lack of new plant construction, but I would like it less if the board spent the money too hastily.”

Nebraska did have one ethanol plant successfully running by 1985. American Diversified Corporation (ADC-1), Nebraska’s first commercial-scale ethanol plant, went online in Hastings in January 1985. The 10-million-gallon plant, built by a California savings and loan company without financial backing from the State of Nebraska, went bankrupt not long after it began operations. Sen. Schmit proposed that the NEADB use a portion of the checkoff raised to purchase the Hastings ethanol plant when it was for sale by the Federal Savings and Loan Insurance Company, which acquired the plant as part of a debt resettlement in 1987. When the board refused Schmit’s suggestion, he formed a non-profit corporation, Nebraska Integrated Ag Products Co., to make a bid on the plant. Sen. Schmit stated that the company “represents all Nebraska farmers who paid the checkoff.”

“The Hastings plant has been very successful for a number of years,” Sen. Schmit said. “It was a real bargain. To say I am disappointed by the attitude of most of the Nebraska Ethanol Authority and Development Board members is an understatement. Maybe the legislation (authorizing the board and ethanol fund) should be repealed and the money returned to farmers.”

NEADB Chairman Matt Connealy said he “had a problem out-bidding a private firm that was going to buy the plant with funds collected for the purpose of building a plant.” For the future, Connealy envisioned the Board investing in smaller ethanol plants, in the 1-million-gallon capacity range located near feed lots in Nebraska.

By November 1989, the ADC-1 plant was under negotiations for sale to Energy Fuels Ventures II in Tulsa, Oklahoma. In May 1990, a Nebraska company, Chief Industries, purchased the Hastings plant and owns it to this day (December 2019).

With frustration mounting, the NEADB hoped their investment in the American Eagle Fuels project near Eagle, Nebraska, would pay off. Although the plant's rated capacity was only 125,000 gallons per year of ethanol, it was the sole supplier of the fuel additive ETBE (ethyl tertiary butyl ether). An ethanol derivative, ETBE seemed to be the fuel of the future. Unlike ethanol, ETBE does not separate from gasoline in the presence of water, so it can be shipped by pipeline. When mixed with gasoline, ETBE also lowers the vapor pressure of fuel, which allows for a high-octane component that burns cleaner.

One of the primary ETBE advocates at the time was David Hallberg, founder of the Renewable Fuels Association. He had left the association and was working with domestic and international companies on ethanol-based fuels including ETBE. Hallberg was also centrally involved in the American Eagle Fuels project and had maintained a relationship with the Nebraska Gasohol Committee. The American Eagle Fuels group proposed a commercial production facility co-located with a small ethanol plant east of Lincoln. American Eagle Fuels worked closely with the University of Nebraska to develop a production and market development strategy to deploy if the NEADB invested funds in the demonstration plant.

To help promote the concept, Hallberg worked with key George H.W. Bush administration staff members to present a presidential briefing and promotional event in Lincoln, Nebraska. Hallberg asked the Nebraska Gasohol Committee to host and coordinate the event in cooperation with American Eagle Fuels and Bush administration officials.



In the late 1980s, just prior to President George H.W. Bush visiting Lincoln, Gov. Kay Orr and NEB Chairman Howard Buffett announced in Omaha that Douglas County would join the State fleet in using ethanol fuels.

In June 1989, the NEADB had the pleasure of hosting President George H.W. Bush (1989-1993), who came to Lincoln for a two-hour visit at the University of Nebraska-Lincoln East Campus to examine developments in alternative fuels. The President's schedule included a visit to the UNL Engine Technology Center, where Todd Sneller, UNL Mechanical Engineering Department Chairman Peter Jenkins, and American Eagle Fuels President Bill Wells briefed the President.

During his visit, President Bush:

1. Drove a flex fuel Chevy Corsica running on E85 (85 percent ethanol and 15 percent gasoline) around the Tractor Test Lab track.
2. Saw a demonstration of two automobiles—one running on unleaded gasoline and one running on ETBE—with a digital display showing the cleaner-burning properties of ETBE fuel.
3. Saw a scale-model of the American Eagle Fuels ETBE processing plant.
4. Learned more about the bacterium *Zymomonas mobilis*, which generates more ethanol production than traditional yeast.



President George H. W. Bush (driver's side) and Nebraska Governor Kay Orr (passenger) test drive a flex fuel Chevy Corsica at UNL in 1989.



American Eagle Fuels was co-owned by BioCom USA of Atlanta, Georgia, which had a 51 percent stock ownership and the NEADB, which had a 49 percent stock ownership. Although American Eagle Fuels had some success, cash outlay fell short. Sneller noted there was never a patent granted for the American Eagle Fuels process, and after continuous financial trouble and failing to pay an occupation tax in May 1992, it was officially dissolved as a corporation despite ongoing interest in ETBE by international automakers. The Nebraska Gasohol Committee shipped ETBE samples to many international automakers during the period ETBE was produced at the Nebraska plant.

After three years, from 1987-1989, there was a single equity investment made by the NEADB, which was the investment in American Eagle Fuels. Recognizing the inherent risk associated with the equity investment strategy enabled by the NEADB legislation, several board members and staff discussed ways to more effectively stimulate investment in ethanol plants. Based on initial results of an incentive law in Minnesota, Nebraska Legislative Bill 1124 was crafted in February 1990 to provide a performance-based incentive fund. The bill shifted the emphasis from the marketing of ethanol to the actual production of ethanol supported by a performance-based financial incentive. Developers of proposed plants could apply for an incentive package that initially would provide substantial tax incentives during five years to companies that built a plant, operated the plant, and produced and sold ethanol. LB 1124 became an important catalyst in ethanol plant development after 1990.

“The Gasohol Committee pursues sales on the retail side,” Howard Buffett said. “The Ethanol Authority has a little different mission. Its mission is to draw industry to the state, and this bill specifically, I believe, will recruit business into the state to produce ethanol.”

The incentive structure required performance standards to be met prior to issuance of incentives. The incentive application, when approved, was signed by the Nebraska tax commissioner and the Nebraska Gasohol Committee administrator. An approved-incentive application, backed by the State of Nebraska, was a powerful tool in obtaining plant financing. The legislation was subsequently extended for a total of 21 years, and was key to ethanol plant development that was stimulated by the clean fuel provisions of Clean Air Act Amendments enacted by Congress in 1990. Ultimately, the production credit approach proved to be an integral part of project financing for many years while also reducing the risk to the State of Nebraska.

In conjunction with the enactment of the incentive program, there was an increased effort by the Nebraska Gasohol Committee staff to assist prospective plants with site location services. The agency also provided ethanol sales information to illustrate a quantifiable increase in ethanol demand. This was a key piece of information requested by financiers during project finance due diligence.

By the early 1990s, the Board developed a sense of direction in matching promotion with production, and focused on getting ethanol plants within the state—a responsibility carried out through the 2000s.



the 1990s

President George H.W. Bush came through with the approval of the Clean Air Act and tax incentives for ethanol production and use, which were extended to the year 2000 at the federal level (reduced from 60 cents per gallon to 54 cents per gallon); and two Nebraska state tax incentives extended to 1992 and 1997. The federal tax incentive extension legislation also provided for a small-producer tax incentive. This new tax incentive was a 10-cent-per-gallon of ethanol income tax credit to small ethanol producers (under 30 million gallons of annual production) on the first 15 million gallons of annual production.

Nebraska's 1990 Unicameral provided a retail tax break at 2-cents-per gallon excise tax exemption on every gallon of Gasohol (10 percent ethanol blend), which was typically passed on to consumers buying the product. This tax exemption was set to expire Dec. 31, 1992, but supporters hoped the 1991 Unicameral would introduce legislation to extend the tax exemption to 2000.

The second Nebraska ethanol tax break was a 20-cent-per-gallon (of ethanol) production credit that went to ethanol producers in the state in the form of tax credit certificates. This exemption was for plants that produced between 2 million gallons and 25 million gallons per year, and would expire in 1997. Tax credit certificates given to ethanol producers were a way to comply with the law, because the Nebraska constitution prohibits the granting of credit by the state to anyone.

Ethanol producers received the tax credit certificates for producing ethanol. The certificates were only good for paying off a motor fuel tax liability to the state. Since ethanol producers did not have a significant motor fuel tax liability, they could not redeem the credit directly. Instead, they sold certificates to a gasoline dealer, who in turn used them to pay off the dealer's motor fuel tax liability to the state.

“Coupling the federal tax incentives with the tax breaks offered to producers in Nebraska may be the best set of circumstances for building ethanol plants I’ve seen in Nebraska in 12 years,” said Steve Sorum in a January 1991 interview with Nebraska Farmer magazine. “The Clean Air bill guarantees expansion of the ethanol market, and the extension of the federal tax incentives makes ethanol production financially attractive.”

In an effort to rein in related cost, the Legislature ordered the transfer of some \$11 million from the equity fund to a fund used to pay the credit. Sneller noted that the Ethanol Board did not back LB 754—authorizing the end of equity financing and the \$11 million fund transfer during the 1992 legislative session—but he conceded, “there’s far less risk in an equity approach.”

Sen. Loran Schmit continued to be critical of the board, saying it had set its own agenda and strayed from the course outlined by the lawmakers who created the board. In January 1990, Sen. Schmit delayed appointments for new board members, and introduced LB 1179 to dissolve the Nebraska Ethanol Authority and Development Board and the Nebraska Gasohol Committee, and return the \$18 million in checkoff funds to Nebraska farmers.

“In my opinion Senator Schmit has held up the committee recommendations to the legislature because we have not agreed to go buy the ethanol plant in Hastings,” said Howard Buffet in a March 1990 interview with the Omaha World-Herald. “That’s not his prerogative. It’s an abuse of his chairmanship of the committee.”

“I didn’t create that fund with the help of other senators to provide jobs for staff persons or hire political hacks as lobbyists or provide membership in clean fuels organizations,” said Sen. Schmit in a March 1990 interview with the Omaha World-Herald. “I did it to create an ethanol industry.”

Todd Sneller noted there was strong push back to Sen. Loran Schmit’s attempt to buy the Hastings ethanol plant. At least two board chairs and several of the prominent Nebraska Ethanol Authority and Development Board members made an important stand. Board members envisioned the funds being used to leverage financing for several plants rather than a single asset.

“Many of the board members were influential in agriculture and several were well-connected politically,” Sneller said. “They eventually convinced Loran that the potential of the fund was significantly greater as a means of leveraging financing for multiple plants rather than a single asset owned by farmers.”

In 1990, Sen. Schmit introduced LB 1124, which created a 20-cent-per-gallon credit in the form of a transferable motor fuel tax certificate for ethanol produced in Nebraska. The credit could be claimed for 84 months up to 25 million gallons annually. The bill directed the tax commissioner to increase the motor fuel tax in 1/10 cent increments to reimburse the highway trust fund for tax revenues not collected because of the credit. It also reduced the excise tax exemption for ethanol blends from the state motor fuel tax from 3 to 2 cents. The exemption expired on January 1, 1993.

“As a result of LB 1124, about five or six ethanol plants were actually built, and that essentially kicked off the ethanol industry in Nebraska as we know it today,” said Sen. Schmit in a 2009 interview. “It was an important major turning point that brought companies like Cargill, Chief Industries, AGP and a couple of other plants into the state, which made us a major source of ethanol production.”

Nebraska legislators continued to introduce a series of bills throughout the 1990s to grow a revenue fund to spur ethanol development throughout the state.

1992

Sen. Loran Schmit introduced LB 754, which redefined qualifying standards for eligibility of the ethanol production credit and reduced credit eligibility from 84 to 60 months. LB 754 also created the Ethanol Production Incentive Cash (EPIC) fund, which transferred funds from the Ethanol Authority Development Board cash fund. The bill increased the motor fuel tax by 1 cent in 1993, 1994 and 1995; $\frac{3}{4}$ cent in 1996 and $\frac{1}{2}$ cent in 1997 to reimburse the Highway Trust Fund for tax revenue not collected because of the credit.

1993

Sen. Roger Wehrbein (1986-2002) introduced LB 364, which created the Nebraska Ethanol Board (NEB) and eliminated the Nebraska Gasohol Committee and the Nebraska Ethanol Authority and Development Board. It also eliminated the Ethanol Authority and Development Board cash fund and transferred all monies to the Ethanol Production Incentive Cash (EPIC) fund, which was approximately \$6 million. The bill also raised from $\frac{3}{4}$ cent to $1\frac{1}{4}$ cents the amount withheld from off-road gasoline refunds for Board operations. The Nebraska Gasohol Committee was renamed the Nebraska Ethanol Board, and a labor representative was added to the board.

1994

Sen. George Coordsen (1986-2003) introduced LB 961, which directed the Nebraska Ethanol Board to file periodic reports and redirected proceeds of the \$1 per ton commercial fertilizer tax from the general fund to the EPIC fund through December 31, 1996, which raised approximately \$16.9 million.

1995

Sen. Jan McKenzie (1992-1997) introduced LB 377, which levied an excise tax of $\frac{3}{4}$ cent per each bushel of corn and hundredweight of sorghum sold in Nebraska through January 1, 2001, and directed the proceeds to the EPIC fund. It also directed General Fund transfers to the EPIC fund in the amount of \$8 million dollars for fiscal year 1996 and again in fiscal year 1997. The bill required ethanol plants operating above 25 percent capacity before Dec. 31, 1995, to maintain at least a 25 percent capacity for six months before receiving credits. This tax generated an annual average of approximately \$7.6 million.

1999

Sen. Elaine Stuhr (1994-2006) introduced LB 605, which created a $7\frac{1}{2}$ cents per gallon credit for up to 10 million gallons of ethanol produced annually in new or expanded facilities for 36 months and defined new and expanded production. Credits could be earned between June 1, 2000, and December 1, 2003. The bill also reduced the excise tax on corn and grain sorghum from $\frac{3}{4}$ cent to $\frac{1}{2}$ cent from January 1, 2000, to January 1, 2001, and reduced the general fund transfer to the EPIC fund from \$6 million to \$5 million in FY2000-01.

The legislation rolling through the Nebraska Unicameral was meant to keep up with the changes on the federal level. Energy independence and reducing pollution in major metropolitan areas continued to be a focus at the national level.

Effective October 1992, the [Energy Policy Act](#) (EPAct) set goals and created mandates to increase U.S. clean energy use and improve overall energy efficiency. One of the 27 titles in the act focused on alternative fuels, which established regulations requiring certain federal, state and alternative fuel provider fleets to build an inventory of alternative fuel vehicles capable of operation on non-petroleum fuels.

The act also established two Department of Energy programs—Federal Fleets and Clean Cities.

Under the 1992 EPA Act, flex fuel vehicles are considered an alternative fuel vehicle. The technology for flex fuel vehicles was made possible by the implementation of second-generation on-board diagnostics (OBD) computer systems developed for cars in the early 1990s. The computer sensors identify the fuel the engine is running and adjusts for higher ethanol content. The first mass-produced flex fuel vehicle was the 1994 Ford Taurus. In 1993, Nebraska Transportation Services Bureau (TSB) ordered 24 flex fuel Chevy Lumina for the state fleet.

Spurred by the focus on cleaner-burner fuels throughout the U.S., national groups began forming to promote ethanol fuels and flex fuel vehicles.

In 1991, Governor Ben Nelson (1990-1998) initiated and chaired the Governors' Ethanol Coalition. Outlined in the 1992 policy statement, the Coalition's goal was "to increase the use of ethanol-based fuels, to decrease the nation's dependence on imported energy resources, improve the environment and stimulate the national economy. This was to be accomplished through a coordinated set of activities designed to educate and demonstrate to the public the benefits of ethanol use; to encourage ethanol fuel production and use through research and market development efforts; and to make investments in infrastructure to support expansion of the ethanol market. The Coalition supported the production of ethanol from corn or other domestic, renewable resources using sustainable agricultural methods and encouraged its use in environmentally acceptable applications." At its peak, the Coalition counted 35 governors from across the country as members who worked on public policy issues in a bipartisan manner.

Established in 1995, the National Ethanol Vehicle Coalition assembled a broad coalition of like-minded industry and government leaders, environmentalists and consumers to reduce oil imports, stimulate the economy and improve the environment. At the time, there were only 10 fuel pumps with E85 (51 – 83% ethanol and the rest gasoline, also known as flex fuel) and 500 flex fuel vehicles in the U.S. By 2018, there were more than 22 million flex fuel vehicles and 4,000 retail stations with E85 in the U.S.

"From the beginning of our program, the major oil companies (Mobil, Exxon and Chevron) fought our efforts to put ethanol into the fuel marketplace," said Dr. William Scheller in a letter to the Nebraska Legislature's Revenue Committee in February 1996. "With our market penetration of Gasohol, the oil company opposition has become more vicious, particularly through the lobbying efforts of the American Petroleum

Institute. Their attacks have been in the technical, environmental, economic and political area. Nebraska Ethanol Board's participation in national organizations has been a major contribution in neutralizing the negative efforts."

In the 1990 Clean Air Act amendments, Congress banned the use of lead in gasoline. Congress required the EPA to reduce gasoline aromatic compounds to the greatest achievable extent, as a way to avoid a repeat of the leaded-gasoline health disaster. The amended act also included mandates for Reformulated Gasoline (RFG) to reduce mobile-source air pollutants by adding oxygenating compounds to gasoline. The oxygenating compounds used to achieve these goals were ethanol and methyl tertiary butyl ether (MTBE). The Clean Air Act, which took effect in November 1992, required 41 U.S. cities with high carbon monoxide levels to maintain 2.7 percent oxygen content in all gasoline sold for at least four months a year.

The ethanol tax incentives were extended and a significant quantity of money for ethanol development was piling up quickly. The new federal policies spurred demand for ethanol and Nebraska was set to capitalize on the market. The NEB had the tools needed to succeed in supporting commercial ethanol development.

In September 1990, Arizona-based International Nutrients of American Inc. broke ground on the Nebraska Nutrients Inc. ethanol plant near Sutherland. Estimated to cost \$20 million, the plant would produce 15 million gallons annually. However, construction started to slow and rumors grew that the venture might not make it off the ground. The Board had agreed to invest \$6.1 million with Nebraska Nutrients as a limited partner after the facility was at 75 percent operating capacity. The Board extended their financing offer from a September 1991 deadline to a January 1992 deadline. Unfortunately, after starting production in October 1992, a dispute between owners left the plant not operating and in litigation for several years. The plant sat mostly idle throughout the 1990s, and was sold in 1998 to Delta T Engineering, an investment group based in Virginia. In late 1999, the Sutherland plant began producing consistently once again.

In 1992, Chief Industries in Hastings was still the only commercial producer of ethanol in Nebraska, producing 12 million gallons per year with plans to double production. A 25-million-gallon plant being built by Minnesota Corn Processors in Columbus was targeted for startup in March 1993.

"We evolved into recruiters," Steve Sorum said. "We worked on projects with a full range of services, from site selection to financing and marketing for ethanol and co-products."

In 1993, the Nebraska Gasohol Committee was combined with the Nebraska Ethanol Authority Development Board to become the Nebraska Ethanol Board as a way to rebrand the agency as focusing on ethanol rather than Gasohol. The agency's role expanded with the move to plant development, marketing, and data and site location assistance. The agency also mounted a national ethanol recruitment strategy where staff participated in national ethanol conferences and marketed the concept of "Nebraska – An Environment for Profit" as a recruitment campaign. The NEB worked closely with Nebraska Public Power District (NPPD) representatives to assist ethanol plant consultants in finding feasible locations, and provided information pertaining to pre-permitted and premier ethanol plant sites in Nebraska.

"I believe that by combining the Nebraska Gasohol Committee and the Nebraska Ethanol Authority Development Board into a single entity, we can keep this focus on the development and the advancement of renewable fuel from agriculture resources, and both Nebraska and the nation can benefit," said Dr. William Scheller, in his testimony to the Nebraska Legislature's Natural Resources Committee in February 1993.

"I believe the new name – Ethanol Board – brings us up-to-date and is a better description than gasohol," said Frank Johannsen, (board member, 1991-1993). "People are unsure what gasohol is, so it's easier to speak of ethanol. By mid-1993, the ethanol industry in Nebraska will have resulted in \$127 million in capital investment, 170 new permanent jobs, 80 million gallons of ethanol production annually, and more than four million dollars in new, permanent payroll."

The Clean Air Act and need for a better octane booster resulted in a boom for ethanol production. The U.S. ethanol industry exploded from 500-700 million gallons per year in the 1980s to 2 to 3 billion gallons in the 1990s. By the end of the 1990s, half a dozen commercial-sized ethanol plants were built and operating across Nebraska:

1. August 1992 – Columbus, Nebraska
2. November 1994 – York, Nebraska
3. April 1995 – Blair, Nebraska
4. October 1995 – Aurora, Nebraska (east plant)
5. November 1995 – Hastings, Nebraska (AGP Corn Processing, closed in July 2013)
6. November 1999 – Sutherland, Nebraska

With the enactment of the Clean Air Act Amendments of 1990, many states considered business recruitment strategies that would stimulate investment in ethanol plants. Ethanol use was projected to increase because of fuel oxygenate requirements and

many states, including Nebraska, were interested in attracting value-added processing facilities to their respective states. Several states offered incentives for ethanol plant development, but the most effective of these incentives was the performance-based production incentive.

Nebraska's 20-cent-per-gallon incentive provided a strong inducement for investment. Despite the indirect, performance-based approach, the incentive provided farm cooperatives and private investors with an economic stimulus for investment in a new value-added industry. It was clear that the incentive must be set at a level where the project economics illustrate a competitive position relative to other competitors and where investors perceive risk has been mitigated. Nebraska's 20-cent-per-gallon production incentive met this criteria, and resulting investment reached nearly \$1 billion in 10 years.

From 1990 to 2000, ethanol opponents insisted that the production and demand for ethanol illustrated that it had become a "mature" industry.

"A key political question was 'do we have enough ethanol plants?'" Sneller said. "Based on testimony from communities, plant developers and the agency, it was evident that more potential existed for ethanol development in Nebraska, and the program was extended for the third and final phase of production incentives despite opposition."

The Nebraska Ethanol Board advocated for extension of credits under a revised structure to spread out the payment period and reduce the total incentive in an effort to make funding and related-revenue generation more manageable. In addition, plant financing was becoming more readily available as plants demonstrated an ability to be profitable.

NEB representatives understood that continued funding of the EPIC fund would require support from both rural and urban senators. In response to concerns that many of the plant construction jobs were initially going to out-of-state workers, a coalition of skilled-trade representatives met with Nebraska Governor Ben Nelson (1991-1999) to discuss the addition of a labor representative on the Nebraska Ethanol Board.

"The goal was to develop a means to organize a workforce of Nebraskans who could help meet the demand for labor required to build plants," Sneller said. "The Steamfitters Local 464 was particularly active in lobbying for this change."

Previously, the Nebraska Ethanol Board had two business representatives. In 1993, an amendment to the statute (LB 364) provided that one of the business representatives would be a labor representative. Governor Ben Nelson and legislators supported the change, and a labor representative position on the Nebraska Ethanol Board was established by statute.

In 1999, Environmental Protection Agency (EPA) Administrator Carol Browner appointed Todd Sneller to a national Clean Air Act Panel. The formation of the Blue Ribbon Panel included leading experts from the public health and scientific communities, automotive fuels industry, water utilities, and local and state government. The panel was created to review the important issues posed by the use of MTBE and other oxygenated fuels in gasoline. While MTBE, ethanol and other oxygenated fuels provided the nation with important clean air benefits, EPA created the panel to gain a better understanding of the public health concerns raised by the discovery of MTBE in water supplies.

“Members of the EPA panel strongly recommended a set of actions that would address the growing problem of MTBE groundwater contamination,” said Sneller in a 2000 press release. “EPA’s announcement of support for a renewable fuel standard and protection of air quality improvements achieved during the past decade, coupled with the MTBE phase-out, represents an excellent start toward adoption of the Blue Ribbon Panel’s recommendations.”

Todd Sneller was the lone dissenter on the EPA panel, which sought to conclude that oxygenated fuels were not an important part of air quality improvement efforts. Sneller disagreed and submitted his dissenting opinion in response to the EPA Blue Ribbon Panel final report.

Summary of Dissenting Opinion

By Todd C. Sneller, Member

EPA Blue Ribbon Panel

The complete text of Mr. Sneller’s dissenting opinion on the Panel’s recommendation to eliminate the federal oxygen standard for reformulated gasoline has been submitted for inclusion in the final report and recommendations of the Blue Ribbon Panel.

Congress thoughtfully considered and debated the benefits of reducing aromatics and requiring the use of oxygenates in reformulated gasoline before adopting the oxygenate provisions in 1990. Based on the weight of evidence presented to the Panel, I remain convinced that maintenance of the oxygenate standard is necessary to ensure cleaner air and a healthier environment. I am also convinced that water quality must be better protected through significant improvements to gasoline storage tanks and containment facilities. Therefore, because it is directly counter to the weight of the vast majority of scientific and technical evidence and the clear intent of Congress, I respectfully disagree with the Panel recommendation that the oxygenate provisions of the federal reformulated gasoline program be removed from current law.

To comply with oxy-fuel standards outlined in the Clean Air Act, MTBE levels in fuel increased to 15 percent, up from prior levels of 0.2 percent to 9 percent. Health complaints like headaches and nausea when filling up with MTBE-blended gasoline quickly began to surface.

In January 2000, CBS' 60 Minutes provided an extensive report on MTBE groundwater pollution that decimated a small California community. Due to its higher solubility in water, MTBE spreads easily underground and polluted groundwater from leaky fuel storage tanks, which led to many states banning the use of MTBE in gasoline. The petroleum industry's competing octane source MTBE was in jeopardy, which provided another opportunity for ethanol to pick up the slack and give another boost to Nebraska's growing industry.

California, the largest U.S. gasoline market, devised a plan to remove MTBE from the state's fuel by 2003. California Gov. Gray Davis called for a study on ethanol's ability to replace MTBE, and initiated the Ethanol Production and Expansion Plan Survey. Estimates for ethanol demand to substitute MTBE in California ranged from 580 million to more than 700 million gallons per year, comprising up to 5 percent of the state's gasoline supply. California also included a growing number of flex fuel vehicles that could use E85 fuel. California's motor fuel market was contingent on the ability to get sufficient, reliable and reasonably-priced ethanol supplies. Could ethanol suppliers double their production capacity to satisfy increased demand in California without severe price increases? The MTBE ban became a California Gold Rush for the ethanol industry.

Nebraska's strategic location on the western edge of the Corn Belt gave the state's producers a competitive edge. Nebraska was poised to offer a quality product at a competitive price that could ship west via railroad, and the Nebraska Ethanol Board wasted no time targeting oil distributors with marketing messages.

"We conducted an ethanol awareness campaign directed at purchasers of ethanol for the California market," said Todd Sneller. "We developed a list of purchasers to send messages focused on timely marketing themes that included attention-getting novelty items like mini railcar tanks and sporting items."

The marketing themes were related to reliable supply, just-in-time delivery, increased and diverse supplies, competitive cost and similar messages. The NEB knew the state had a huge opportunity to meet California's fuel demands.

By early 2000, President Bill Clinton's administration signaled efforts to begin phasing out methyl tertiary butyl ether (MTBE), and by March the EPA announced they would phase out MTBE under provisions of the Toxic Substance Control Act.

In the Energy Policy Act of 2005, which amended the Clean Air Act, the government prompted gasoline refiners to transition to the use of ethanol as a gasoline additive in place of MTBE. The Act also established the Renewable Fuel Standard (RFS), which increased the amount of biofuels mixed with gasoline to 4 billion gallons by 2006, 6.1 billion gallons by 2009 and 7.5 billion gallons by 2012.

Two years later, the Energy Independence and Security Act of 2007 further amended the Clean Air Act by expanding the Renewable Fuel Standard program to 36 billion gallons by 2022. The Environmental Protection Agency (EPA) implemented the RFS program despite ongoing opposition by the oil industry. The RFS requires U.S. transportation fuel to contain a minimum volume of renewable fuel, which includes both conventional and advanced biofuels.

Since the Renewable Fuel Standard was established, there has been a reference to an "ethanol mandate or ethanol requirement," but that reflects a misunderstanding of the compliance requirement for obligated parties. The RFS requires obligated parties to use "renewable fuels" of various types. There is no corn ethanol requirement. There is no ethanol requirement. There is a cap on corn starch-derived ethanol that obligated parties may choose to use in fulfilling the annual Renewable Volume Obligations (RVOs) assigned to each obligated party.

The choice to use ethanol to fulfill volume requirements under the Renewable Fuel Standard is typically because ethanol is the most cost-effective option, and it allows refiners to capitalize on the octane-enhancing, carbon-reducing and cost-reducing attributes of ethanol. Ethanol use as a compliance strategy by obligated parties is not a mandate, but a practical choice. The requirements of the Renewable Fuel Standard are admittedly complex but the characterization of the RFS as an "ethanol mandate" has never been accurate.

During the 2000 legislative session, Sen. Ed Schrock (1990-1993 and 1995-2007) introduced LB 1234, which created the Ethanol Pricing Task Force to examine the practices, policies and methods by which ethanol prices are set and also prohibited the sale of fuel containing the gasoline oxygenate MTBE. As originally introduced, LB 1234 would have required all non-premium gasolines sold in Nebraska to contain ethanol, similar to the highly successful program in Minnesota.

Supporters of the original measure had hoped to give ethanol a competitive edge against regular unleaded gasoline, which was often priced lower at the pump. However, in the face of stiff opposition, the ethanol provisions of LB 1234 were amended to create a task force to examine motor fuel pricing.

Nebraska Ethanol Board's founding senator, Sen. Loran Schmit, was out of the Unicameral but still lobbying on behalf of ethanol producers. In early 2000, Sen. Schmit was working on behalf of several groups of farmers, who were interested in building ethanol plants, and they needed Schmit to lobby a new incentive bill through the legislature.

The debate surrounding the incentive bill (LB 536) was on whether to continue Nebraska's 15-year-old ethanol incentive program, which otherwise would expire in 2004. Discussion was spurred by investor proposals for two new plants—one near Plainview and one near Axtell—and proponents argued that farmers get better corn prices because of ethanol production.

Schmit worked with Nebraska Senators Cap Dierks (1986-2003, 2007-2011), Doug Cunningham (2000-2006) and Jim Cudaback (1991-2007) to draft LB 536, which amended the original Ethanol Development Act. LB 536 passed 45 to 3, was signed into law by Gov. Mike Johanns on May 31, 2001, and became effective Jan. 1, 2002. The bill formally reauthorized the Ethanol Production Incentive Cash (EPIC) fund, which provided a credit of 18 cents per gallon of ethanol produced for new facilities and 7.5 cents per gallon for existing facilities that expanded production. The tax credits were again in the form of non-refundable, transferrable motor vehicle fuel tax credits. To qualify for credits, the plant had to be operational by June 30, 2004.

"The passage of this law means Nebraska's industry will continue to grow," said Mike Alberts (board member, 1997-2006) in a press release. "Demand for ethanol is increasing across the U.S. and new plants will be built to satisfy the demand. Combined with our grain supplies, livestock feeding and access to western markets, the new incentive package gives Nebraska an edge in attracting new production."

The amended Ethanol Development Act (LB 536) led to six additional plants being built creating the second generation of ethanol plants in Nebraska, making the state a major producer and second in the country in ethanol production.

"I think it's safe to say that without having passed that bill we probably would not have gotten to this milestone," said former senator Loran Schmit.

Although Nebraska's ethanol industry was receiving tax incentives, the plants contributed heavily to the tax base where they were built. In a 2000 Nebraska Economic Impact Study, ethanol plants reported combined purchases of \$627.5 million. Approximately \$440 million was paid for grain (not subject to sales tax). An additional \$187.5 million was spent on various goods and services like chemicals, spare parts, repairs, office expenses, etc. If a 5 percent sales tax is assumed on these items, the state's ethanol plants returned \$4.7 million annually to the state general fund. Ethanol plants also reported combined payrolls of \$33.5 million. If a 3.5 percent income tax on employees is applied, that equals another \$1.2 million paid back to the state.

According to the Nebraska Public Power District's study *Employment and Other Economic Impacts Associated with the Construction of an Ethanol Production Facility*, a 40-million gallon ethanol plant recruited to a community would:

- Provide a one-time boost of \$71 million to the local economy during construction.
- Expand the local economic base of the community by \$70.2 million each year through the direct spending of \$58 million.
- Create 33 full-time jobs at the ethanol plant and 120 jobs throughout the local economy.
- Increase household income for the community by \$6.7 million annually.

ETHANOL PRODUCTION INCENTIVE CASH (EPIC) FUND

When 1990 amendments to the Clean Air Act created strong new demand for ethanol, it became clear that new plants would be built. In an effort to attract these plants to Nebraska, the Legislature, at the request of the Nebraska Gasohol Committee and the Ethanol Authority and Development Board (EADB), created the Ethanol Production Incentive Cash (EPIC) fund. This proved to be a transformative legislative initiative that became the catalyst for significant ethanol production in Nebraska.

In 1992, LB 754 redefined qualifying standards for ethanol production credit eligibility. The bill:

- Reduced credit eligibility from 84 to 60 months.
- Created the Ethanol Production Incentive Cash fund and transferred funds from the EADB cash fund.

- Increased the motor fuel tax by 1 cent in 1993, 1994 and 1995; $\frac{3}{4}$ cent in 1996 and $\frac{1}{2}$ cent in 1997 to reimburse the Highway Trust Fund for tax revenue not collected because of the credit. If the increased motor fuel tax revenue was not sufficient to pay the cost of the ethanol credits in 1993-1997, the EPIC fund would reimburse the Highway Trust Fund for the deficit amount. All credits granted in 1998, 1999 and 2000 would reimburse the trust fund from the EPIC fund.
- Also created a 50 cent per gallon credit for Nebraska produced ETBE through December 31, 2000.

LB 754 marked a turning point in ethanol incentive funding, phasing out the role of the Highway Trust Fund and the fuel tax. The EPIC fund was created for the purpose of reimbursing the Highway Trust Fund for revenue losses associated with the redemption of fuel tax certificates earned by ethanol plants. Transfers from the EPIC fund intended to replace fuel tax increases to hold the Highway Trust Fund harmless as ethanol credits were redeemed. Rather than an open-ended increase in the gas tax, LB 754 increased the motor fuel tax by defined and gradually-declining amounts. The EPIC fund was required to reimburse the Highway Trust Fund when the amount of production credits redeemed exceeded the amount of revenues raised by the extra motor fuel taxes. Thus, as the additional fuel tax phased out, the EPIC fund would assume greater responsibility for reimbursing the Highway Trust Fund. Beginning in 1998, the EPIC fund had assumed full responsibility for funding ethanol credits.

The success of the ethanol production incentive program led to a series of bills introduced in the 1993 through 1995 sessions of the Nebraska legislature to provide sufficient revenue streams to the EPIC fund to avoid impacting revenues to the Highway Trust Fund. Two successor programs to the production incentive program that expired at the end of 2000 remained in effect throughout the next decade. In 1999, the legislature foresaw that a large balance would remain in the EPIC fund at the end for FY2000-2001 even after meeting its commitments to the Highway Trust Fund. LB 605, enacted in 1999, served as a production incentive; and LB 536, enacted in 2001, renewed the more lucrative incentives targeted toward new plant startups.

LB 536 was enacted May 31, 2001, and became effective Jan. 1, 2002. Nebraska provided a credit of 18 cents per gross gallon of ethanol produced, before denaturing. The tax credits were in the form of non-refundable, transferrable motor vehicle fuel tax credits.

Plants had to have produced ethanol in order to qualify for credits. When a plant produced a minimum of 2 million gallons in any calendar year, state tax credits were paid to the plant in the form of transferable motor fuel tax certificates. The certificates were issued by the Nebraska Department of Revenue and could only be used to pay a state gas tax liability. Ethanol producers usually did not have gas tax liabilities large enough to cover the number of certificates issued, so they were sold to an oil distributor at a small discount. The ethanol producer received cash and the oil distributor used the tax certificates to offset their own state gas tax liability.

The EPIC fund existed to reimburse the Highway Trust Fund for fuel excise taxes not collected as a result of Nebraska's ethanol production credit program. EPIC served as a collection point for revenue from several sources including the grain checkoff. Its only expenditures were transfers to the Highway Trust Fund and a relatively small amount to the Department of Agriculture for grain check-off collection fees.

One facility began earning credits in fiscal year 2002-2003, and a second facility started claiming credits in the following fiscal year. These two facilities completed their entitlement period during fiscal year 2010-2011, and the other eight qualified-facilities completed eligibility during FY 2011-2012. Four of the 10 producers received the maximum credits allowed under that statute, with the 10 plants earning more than \$183.7 million in total production credits during the program. That was the final tally for the EPIC fund, Nebraska's third and largest ethanol producer incentive program, which ran from FY2002 to FY2012. Sixty percent came from the grain checkoff—an excise tax on the sale of each bushel of corn and each hundredweight of grain sorghum, and the rest came from general funds; transfers from the Petroleum Release Remedial Action Cash Fund; off-road refunds—retention of a portion of tax refunded on motor vehicle fuels for purchases; denaturant tax—a tax on natural gasoline used as a denaturant; Agricultural Alcohol Fuel Tax Fund transfers; and interest while EPIC maintained a positive balance, which continued to accrue until Dec. 31, 2012. On that date, slightly more than \$50,000 remained. One-half of all unexpended and unobligated funds transferred to the commodity boards promoting the products from which funds were collected. The remaining one-half of unexpended and unobligated funds transferred to the state's general fund.

The Nebraska Department of Revenue and the Nebraska Ethanol Board jointly submitted annual reports related to the EPIC fund. The reports are divided into four sections—agreements, analysis, funding and conclusion—and can be viewed online by visiting www.revenue.nebraska.gov.

Despite the potential of record ethanol demand coming from the western U.S., the Nebraska Ethanol Board's future was up for legislative debate again. The Nebraska Legislature's Program Evaluation Committee met Feb. 3, 2000, to revisit the Board's role considering the Ethanol Development Act's sunset provisions ending direct incentives for ethanol production. During the 1990s the state authorized 20 cents per gallon tax incentive, up to \$5 million annually during five years, for ethanol plants. A revised incentive authorized 7 cents per gallon up to 10 million gallons annually, or \$700,000 annually, until the ethanol incentive fund was depleted or until the end of 2003. That is when the program would sunset by law. At the time, about \$10 million in incentives remained.

Sen. Ron Raikes (1997-2009) sponsored LB 325, which, in part, proposed to eliminate the Nebraska Ethanol Board effective July 1, 2006. In February 2005, the Revenue Committee voted 6-0 in favor of a measure to abolish the Nebraska Ethanol Board despite opposition from 10 organizations and individuals, including the Nebraska Farmers Union, Nebraska Farm Bureau and Nebraska Corn Growers. Ethanol advocate John Hansen, President of the Nebraska Farmers Union, said the vote sent a bad message.

"It is the single most destructive and short-sighted action I have seen in 15 years," Hansen said. "It punishes the most efficient and productive commodity board in the state. The Nebraska Ethanol Board is the shining star of all the Nebraska boards and it has done, by far, the best job of accomplishing their mission on a very meager budget."

"The oil industry continued efforts to derail ethanol development in Nebraska," said Todd Sneller. "Lobbyists from the major petroleum organizations were in large part behind the effort to sunset the ethanol development program. Former Senator Loran Schmit and agency representatives mounted a campaign to counteract the agency elimination proposal. Many community members and community economic development representatives played a key role in lobbying for retention of the ethanol program."

In February 2005, the South Platte United Chambers of Commerce began gathering support to defeat the bill that would eliminate the Nebraska Ethanol Board. Don Reynolds, executive director for the South Platte Chambers of Commerce, said eliminating the Nebraska Ethanol Board would send a negative message, especially at a time when momentum is growing for renewable and environmentally-friendly fuels, such as ethanol and soy biodiesel, to help reduce the country's growing dependency on imported fossil fuels.

“We have seen the good work of the Ethanol Board in developing programs that helped develop ethanol production in the state of Nebraska,” Reynolds said. “We think it is critically important that the board is still in place to continue the promotion in the future.”

FULL STEAM AHEAD

Thirty-five years after the board was established, the original vision paid huge dividends. In August 2006, the state boasted 12 operating ethanol plants, with nine more under construction and 29 more projects in various stages of development. By 2007, 30 percent of the state’s annual corn crop flowed through ethanol plants.

“The ethanol industry is off to an impressive start, but this is just the beginning,” said Todd Sneller in a 2007 interview. “Sustained growth will continue, and many Nebraskans will share in the industry’s success.”

The state saw a brick and mortar boom, and throughout the decade plants rose from the rural plains spurred by investment incentives provided by the Ethanol Production Incentive Cash (EPIC) fund. The following successful plants were built during the 2000s:

- January 2003 – Plainview, Nebraska
- September 2003 – Minden, Nebraska
- March 2004 – Trenton, Nebraska
- May 2004 – Central City, Nebraska
- January 2006 – Lexington, Nebraska
- May 2007 – Jackson, Nebraska
- May 2007 – Ord, Nebraska
- June 2007 – Mead, Nebraska
- August 2007 – Albion, Nebraska
- September 2007 – Ravenna, Nebraska
- October 2007 – Adams, Nebraska
- October 2007 – Fairmont, Nebraska
- October 2007 – Madrid, Nebraska
- October 2007 – Norfolk, Nebraska
- March 2008 – Cambridge, Nebraska
- June 2008 – Atkinson, Nebraska
- June 2008 – Wood River, Nebraska
- December 2008 – Bridgeport, Nebraska

Nebraska Governor Dave Heineman (2005 – 2015) and Congressman Tom Osborne fill up with flex fuel.



LORAN SCHMIT & THE ASSOCIATION OF NE ETHANOL PRODUCERS

Sen. Loran Schmit (1969-1993) spent 24 years in the Nebraska Legislature, but when his political career ended he saw a need to represent ethanol enthusiasts as a lobbyist and consultant.

“All my professional and commercial activity has been connected with agriculture,” Schmit said. “When our ancestors founded this nation, it is my belief that they intended that it should be governed principally by citizen legislators who would leave their businesses, farms and professions for a period of time to assist our neighbors in the governing of the country. I do not believe it was ever intended that politics should be a lifetime career. I hope that during my lifetime I have been able to make a small contribution for the betterment of the state and nation as a farmer, livestock man, pilot and politician.”

In February 2008, Schmit formed the Association of Nebraska Ethanol Producers (ANEPP), a trade association for the ethanol plants popping up across Nebraska’s rural landscape.

“Loran had many individual clients, and as the numbers grew it became apparent that many of the companies faced similar tax and permit compliance issues,” said Todd Sneller. “The goal of the association was strength in numbers when it came to resolving regulatory issues of mutual concern.”

In a 2007 interview, former senator Schmit said, “When I was kid, we produced 400 million bushels of corn annually. This year (2007), we produced 1.4 billion. One billion more bushels!”

Schmit was inducted into the Nebraska Hall of Agricultural Achievement in 1980. Governor Ben Nelson (1991-1999) often referred to Schmit as the “Father of the Ethanol Industry,” but Loran always gave credit to his legislative colleagues, Nelson and all the governors and Nebraskans in Congress since 1971 who were then and continued to be strong supporters of ethanol.

A few of Loran Schmit's career highlights include the following:

- 1971 (As Legislator) – Passed LB 776 which created Ethanol Board in Nebraska
- 1972-1986 (As Legislator) – Passed various bills to encourage use of ethanol
- 1987 (As Legislator) – Passed legislation which created Ethanol Production Incentive Cash (EPIC) fund (\$17M)
- 1990 (As Legislator) – Passed LB 1124 (5 plants; \$25M each)
- 2001 (As Lobbyist) – Assisted in passage of LB 536 – (6 plants; 5 qualified for \$22.8 M each)

ADDITIONAL DEVELOPMENTS



An ethanol-powered bus in Lincoln.

In August 2000, StarTran – Lincoln’s municipal bus system – was selected as one of the first urban transit systems in the world to test a blend of ethanol and diesel fuel. The experimental bus fuel was designed to meet higher federal clean air standards by reducing engine emissions. Ethanol proponents hoped the new fuel would give the Nebraska ethanol industry an opening to the nation’s 50 billion gallon diesel market. Many experimental ethanol fuel tests were done throughout the years. The fuel blend was technically feasible but most demonstrations were not practical for commercial development, including the StarTran bus experiment.

During Husker Harvest Days in 2000, Gov. Mike Johanns (1999-2005) announced a statewide education campaign aimed at increasing the awareness of the benefits of E10 Unleaded. The marketing focus again switched from Super Unleaded to E10 Unleaded.

“E10 Unleaded with ethanol is the right choice if you care about your environment, your tax bill, your home state, your country, or your car,” Gov. Johanns said in a press release. “In some way, E10 unleaded with ethanol can help your family and your community. So let’s get with it, Nebraska—and fill up with E10 Unleaded with ethanol every time we pull up to the pump.”

The final credits from the Ethanol Production Incentive Cash (EPIC) fund were paid out by the end of 2011. Since the board no longer received funds from grain checkoffs and various other sources like it did when EPIC was in progress, the funding of the board changed. Since January 1, 2010, the Nebraska Ethanol Board receives funding from two sources:

1. Ethanol Producer Excise Tax on Denaturant (1.25 cents/gallon)
 - a. Majority of NEB funds
2. A refund on motor fuels used for agricultural, quarrying, industrial, or other non-highway purposes (1.25 cents/gallon)
 - a. Small amount of NEB funds

By 2012, all tax incentives for ethanol-blended motor fuel ended, too. Previously there had been a 5 cent per gallon state gasoline tax reduction for ethanol blends. This incentive ended in December 2008. There was also a 4.5 cent per gallon federal gasoline tax exemption for ethanol blends which ended in December 2011.

To be competitive and profitable during times of fluctuating oil and grain prices, ethanol producers looked for strategic ways to bring in profit beyond the ethanol stream. Distillers grains were already a valuable co-product sold for livestock feeding, but corn oil extraction added another profitable co-product. Almost all plants in Nebraska were able to add this valuable commodity to their production output without losing resources.

Prior to 2000, the corn oil market was relatively small, but by 2013 corn oil was the fastest growing feedstock in biodiesel production. According to the U.S. Energy Information Administration, corn oil as a biodiesel feedstock grew by 245 percent between 2011 and 2013. In 2016, the Duonix Beatrice biodiesel plant in Beatrice, Nebraska, started operation using corn oil as a feedstock providing a market right in the ethanol industry's backyard.

To capture the economic impact of the state's newest large-scale agriculture industry, the Nebraska Ethanol Board commissioned a study with the University of Nebraska-Lincoln Department of Agricultural Economics and Bureau of Business Research in 2014. The study— "Economic Impacts of the Ethanol Industry in Nebraska"—was released in April 2015 and revealed Nebraska's ethanol production capacity growth between 1995 and 2014 was tenfold.

Since 2007 the effects on Nebraska's economy and rural areas have been both sustained and substantial, the study noted. In 2014, the total value of ethanol, distillers grain production and corn oil was \$4.951 billion. View the full 2014 economic impact study here:

<https://ethanol.nebraska.gov/library/research/economic-impact.html>

Throughout the decade, several plants changed ownership and continued to run successfully and even expand. Expansions at plants included construction additions, new technology, carbon reduction and debottlenecking. In June 2018, Nebraska had a nameplate capacity of 2.281 billion gallons annually for 25 ethanol plants—an increase of 758 million gallons from January 2010.

TECHNOLOGY ADVANCES FOR LOW CARBON, HIGH OCTANE FUEL

Investors at plants knew they had to do more than expand, they had to reduce their carbon footprint to compete in lucrative gasoline markets like California. With the goal of reducing their carbon score, plants actively switched to using cleaner-burning fuel sources like natural gas to power the plants, reducing water usage, and increasing output with fewer inputs.

Farmers providing the feedstock for the ethanol plants also play an important role in the overall carbon score of ethanol. Through stewardship, new genetics and improved management practices, Nebraska farmers grow more with less—less fertilizer, less chemicals, less water, less land and less of an impact on the environment. American farmers grow five times more corn than they did in the 1930s, on 20 percent less land.

According to a 2017 U.S. Department of Agriculture study—[A Life-Cycle Analysis of the Greenhouse Gas Emissions of Corn-Based Ethanol](#)—renewable ethanol is cleaner than ever. Greenhouse gas emissions associated with ethanol are 43 percent lower than gasoline. USDA also found that even using conservative estimates, for every 1 BTU (British Thermal Unit) used in making ethanol, 2.1 BTUs are produced.

Emerging technology in production and new feedstock sources continue to make the ethanol industry more efficient, but the U.S. Environmental Protection Agency was not accounting for these innovations when they considered ethanol as a motor fuel to reduce greenhouse gases. EPA had not updated their data since 2010, and the use of outdated science created a hurdle for ethanol to be even more competitive in the fuel market.

In 2018, the American Coalition for Ethanol released “[The Case for Properly Valuing the Low Carbon Benefits of Corn Ethanol](#)” White Paper. The paper states, “One of the more direct ways to capitalize on agriculture's ability to mitigate greenhouse gas emissions is to properly acknowledge the role that corn production plays in enhancing soil carbon maintenance and sequestration in the U.S.”

Cellulosic ethanol, ethanol made from cellulose (fiber portion of biomass), emerged on the market using corncobs, husks and stalks to produce the renewable fuel. By

2014, commercial-scale cellulosic plants popped up in Emmetsburg, Iowa; Nevada, Iowa; and Hugoton, Kansas, but closed their doors shortly after becoming operational. Chasing that “advanced category” of the Renewable Fuels Standard, traditional ethanol plants looked to invest in commercial-ready cellulosic biofuels, including cellulosic ethanol made from corn kernel fiber. This technology allows an ethanol plant to reprocess the kernel fiber or hull to make ethanol that qualifies for cellulosic Renewable Identification Numbers (RINs) and a lower carbon score.

The Renewable Fuel Standard (RFS) was enacted, in part, to drive innovation and production of low carbon biofuels that reduce greenhouse gas emissions by at least 50 percent more than petroleum.

Many Nebraska plants have demonstrated leadership in technology adoption. When the Renewable Fuel Standard replaced the Oxygenated Fuel Program in 2005, several provisions focused on encouraging innovation in ethanol production processes and feedstocks. Nebraska plants continue to be among the early adopters of technologies incentivized by the Renewable Fuel Standard. Because of innovative technologies, many Nebraska ethanol plants have positioned themselves to produce lower-carbon ethanol that captures a premium value in several domestic and international markets.

HIGHER BLENDS OF ETHANOL FUEL HIT THE MARKET

To protect emission controls and vehicle engines, the U.S. Environmental Protection Agency (EPA) prohibits the introduction into commerce of fuels or fuel additives that are not substantially similar to fuels currently certified for vehicles and emissions. However, stipulations in the Clean Air Act authorize EPA to grant waivers for fuels if it can be demonstrated that vehicles using the fuels will continue to meet emissions standards during their “full useful life.”

In March 2009, Growth Energy—a coalition of U.S. ethanol supporters—and 54 ethanol manufacturers applied for a waiver to increase the allowable amount of ethanol in gasoline from 10 percent to 15 percent. On October 13, 2010, the Environmental Protection Agency partially granted the waiver request, which allows fuel manufacturers to introduce E15 (15 percent ethanol and 85 percent gasoline) into commerce for model year 2007 and newer light-duty vehicles. The EPA determined there was not significant data to grant the waiver for older vehicles, but on Jan. 21, 2011, after additional U.S. Department of Energy testing, the EPA took further action granting a waiver to model year 2001 and newer vehicles. Taken together, the waivers allowed the introduction into commerce of E15 for use in light-duty vehicles model year 2001 and newer. Read the full report here: [“Regulation History of the E15 Partial Waivers Under the Clean Air Act”](#).

In 2015, Agriculture Secretary Tom Vilsack announced that the U.S. Department of Agriculture (USDA) would partner with 21 states through the Biofuel Infrastructure

Partnership (BIP) to nearly double the number of fueling pumps nationwide that supply renewable fuels to American motorists. With matching commitments by state and private entities, BIP invested \$210 million to strengthen rural economies via the enhancement of biofuel marketing structure in states. Nebraska received nearly \$2.3 million in federal funds for BIP.

The Nebraska Ethanol Board, Nebraska Corn Board, Nebraska Environmental Trust, individual ethanol plants and the “Prime the Pump” nonprofit organization all contributed matching funds to support the Biofuel Infrastructure Partnership effort. Through Nebraska’s grant, 80 fuel pumps were proposed for installation across the state, with emphasis in high traffic areas, such as Lincoln, Omaha and along the Interstate 80 corridor. Kum and Go convenience store locations in and around the Omaha metro were the first Nebraska sites to offer E15 fuel as part of the program.

By executive order in Fall 2016, Nebraska Gov. Pete Ricketts (2015-2023) declared that all state flex fuel vehicles would use E85 and all other gasoline-powered state fleet vehicles would use E15. State fleet fueling sites were upgraded to E15 from Lincoln to Scottsbluff.



*Gov. Pete Ricketts (2015 – 2023)
pumping E15 in a State of NE vehicle.*

By 2019, Nebraska had more than 40 stations selling E15 and new stations adding the blend to fuel choices. However, a hiccup remained—in Nebraska (and many other states), E15 was limited for use in only flex fuel vehicles between June 1 and Sept. 15 due to Reid Vapor Pressure (RVP). Reid Vapor Pressure is the measure of gasoline volatility and how quickly fuel evaporates. Due to an antiquated regulation from 1990, the federal government holds E15 to tougher standards than other fuels during the summer. Ethanol supporters worked tirelessly to lift RVP restrictions, so E15 could be sold year-round, thereby opening additional markets to domestic, renewable fuels.

On Oct. 9, 2018, at a rally in Council Bluffs, Iowa, President Donald Trump (2016-2020) voiced support again for E15 by directing the U.S. Environmental Protection Agency (EPA) to begin the rulemaking process to allow the fuel to be sold nationwide year-round.

“We are grateful to the President for taking this crucial step toward year-round E15 sales,” said Sarah Caswell, (administrator, 2018-2019) in a 2018 press release. “We are hopeful this long overdue federal waiver will be finalized and effective before the summer driving season.”

“We should see an increase in fuel retailers across the state and nation offering E15 when the red tape and regulatory barriers are removed,” said Randy Gard (board member, 2017-current) in a 2018 press release. “The waiver takes the perceived risk out of the market for fuel retailers, which will stimulate ethanol markets. E15 gives consumers another renewable, low-cost option at the pump.”

E30 FLEET DEMONSTRATION

As E15 was accepted into the marketplace, some pushed for E30 (30 percent ethanol and 70 percent gasoline) to be the “standard” ethanol fuel for high-compression engines that were expected to be built in future vehicles. However, E30 is currently designated for flex fuel vehicles only.

In 2016, Glacial Lakes Energy and ICM initiated the E30 Challenge in Watertown, South Dakota. The campaign encouraged the voluntary use of Premium E30 fuel in both flex fuel and non-flex fuel vehicles. Their main goal was “to drive change to help communities recognize the value that higher blends of ethanol have to offer.” The E30 Challenge was deemed a success as E30 fuel retailers increased their sales by 400 percent during May and June.

Watertown’s E30 Challenge is considered an unscientific, social experiment with anecdotal evidence suggesting the challenge was a great success with most of the town participating. However, no scientific studies were done or measurements taken by an impartial third party. Their E30 Challenge did prove that consumers would be willing to use higher blends of ethanol in non-flex fuel vehicles, given enough incentive to do so.

As a result of the anecdotal technical evidence generated by the use of E30 in Watertown, Nebraska decided to conduct a scientific evaluation of the viability of E30 for use in non-flex fuel vehicles. The study proposed to track a fleet of 60 state vehicles—some of them Nebraska State Patrol vehicles—using E30 fuel with regular maintenance checks under the supervision and guidance of the University of Nebraska-Lincoln.

On Sept. 25, 2018, the Environmental Protection Agency approved Nebraska’s request for an exemption to conduct a one-year testing program to assess the effects between vehicles using E10 and vehicles using E30 blends. The testing included an assessment of vehicle performance, fuel economy and emissions control systems in state-owned vehicles. The final report of the demonstration was published in the scientific journal *Fuel*, and concluded that E30 is safe to use in

non-flex fuel vehicles and economically viable for long-term adoption. A [summary report](#) can also be found on the Nebraska Ethanol Board website.

NATIONAL BRANDING WITH AMERICAN ETHANOL

In 2015, it was decided that ethanol would develop a national brand under the name “American Ethanol” with a new logo to be used during all ethanol promotions. This was done in part for brand recognition, but also to help consumers at the pump as their choices began to diversify, with E10, E15, E20, E30, E40 and E85 all becoming more available.

The Nebraska Ethanol Board continued to evolve its marketing strategy to adopt promotional themes that worked in national markets. Similar to the transition from gasohol to super unleaded, in 2019, E15 started to be promoted as unleaded 88. The 88 is in reference to the octane number the fuel carries at the pump.

GOVERNORS’ BIOFUELS COALITION

In 2009, the Governors’ Ethanol Coalition changed its name to the Governors’ Biofuels Coalition. This was done in an effort to bring biodiesel and other biofuels into the fold. Some states outside of Nebraska were working on biofuels other than corn ethanol and requested consideration for the change. Since the inception of the Coalition in 1991, four Nebraska governors have served one or more terms as chair of the organization.

BREATHE EASY—PROMOTING CLEANER AIR WITH ETHANOL

When MTBE was phased out of motor fuel, oil refiners were not keen to switch to ethanol as an octane enhancer because they did not want to give up market share. Many refiners chose to use their own chemicals and boost octane with aromatic compounds such as benzene, toluene and xylene (BTX). The EPA has classified aromatics as a hazardous pollutant because they do not fully combust, and they escape from the vehicle tailpipe into the air.

Exposure to urban air and high levels of traffic pollution have profound effects on human health. In March 2011, an EPA report estimated that reducing particulate matter (PM) according to Clean Air Act requirements would save nearly 230,000 people from early death in the year 2020, and save nearly \$2 trillion in health-related expenses.

Led by the Nebraska Ethanol Board, Clean Fuels Omaha was formed as a public and private coalition focused on the use of alternative fuels as a strategy to improve human health and the quality of breathable air. Focusing specifically on the pollution caused by gasoline, as well as the environmental and health benefits of using ethanol, Clean Fuels Omaha became a campaign to drive awareness of air quality in the metro area. The coalition focused on building collaborative relationships with key non-profits, educational institutions, government entities and private business centered on the clean air aspects of biofuels.

On a global level, ethanol was quickly becoming a solution to some of the world's worst air quality. In 2017, China and Mexico both made efforts to increase ethanol in their motor fuels. China announced a new nationwide ethanol mandate that expanded the use of E10 from 11 trial providences to the entire country by 2020. The measure would quadruple the ethanol consumption in China, the largest motor vehicle market in the world. Mexico announced they would increase the amount of ethanol blended in their fuel from 5.8 percent to 10 percent. The decision to move Mexico toward more renewable and sustainable energy sources offers environmental, economic, social and public health advantages.

Ethanol continues to be the safest, renewable octane enhancer for motor fuel. As a result, public-private coalitions began to form to combat the adverse health effects of aromatic compounds. The human health threats of gasoline are the soft underbelly of the oil industry. Consumer-facing efforts throughout the decade focused squarely on the clean air and human health benefits of ethanol with one message—choosing fuel with ethanol makes the air cleaner and healthier for humans.

RENEWABLE FUEL STANDARD

After 2022, the U.S. Environmental Protection Agency (EPA) determines the volume amounts of renewable fuel to be blended in the U.S. fuel supply. There has been a renewed interest by Congress in the Renewable Fuel Standard (RFS), particularly as the law relates to other legislative efforts including Reid Vapor Pressure requirements for ethanol fuel blends containing more than 10 percent ethanol, and on the oversight of the Renewable Identification Number (RIN) market, among other things. Opponents—mostly oil companies—proclaim it is time to amend or repeal the Renewable Fuel Standard, while others contend the best course of action is to maintain the status quo.

During the Trump administration, under EPA Administrators Scott Pruitt and Andrew

Wheeler, there was a massive increase in hardship waivers granted to oil refiners. Refiners are required by the U.S. Renewable Fuel Standard to blend increasing volumes of biofuels like ethanol each year, but the EPA can offer exemptions for facilities producing less than 75,000 barrels per day, if they experience “disproportionate economic hardship.” The waivers free companies from their obligation to blend ethanol into their gasoline, or purchase RINs instead. This led to a destabilization of the RIN market and an undermining of the Renewable Fuel Standard.

The position of the Nebraska Ethanol Board, along with most ethanol advocacy groups, was that the RFS worked as expected and that changing it would cause great harm to the ethanol industry as well as the environment and economy. In May 2018, a coalition of ethanol and farm groups sued the U.S. Environmental Protection Agency, challenging its decision to free three refineries, including one owned by billionaire investor Carl Icahn, from annual biofuels requirements.

BOARD ADMINISTRATOR LEAVES A LEGACY

After serving as Nebraska Ethanol Board administrator for nearly 40 years, Todd Sneller retired Sept. 14, 2018.



Todd Sneller at his desk in the NEB office.

Sneller started his career in 1976 as a staff assistant with the Agriculture Products Industrial Utilization Committee, now the Nebraska Ethanol Board. He left for a brief period from 1978 to spring 1979 to work as a business development consultant for the Nebraska Department of Economic Development. In May 1979, the Agriculture Products Industrial Utilization Committee recruited him to serve as their administrator, a role he held until his retirement.

Starting his career as Administrator during a period when the U.S. faced the third serious oil supply shortage of the 1970s, Sneller engaged in advancing ethanol from a concept to a partial replacement of fossil fuels.

“There were considerable challenges in plant financing, engineering and design along with nearly constant public policy changes, but the sector continued to grow slowly and steadily,” said Todd Sneller (administrator, 1979-2018). “By any standard, the ethanol development story is a story of success, vision and perseverance.”

By 2019 the U.S. gasoline supply included more than 10 percent ethanol and Nebraska ranked No. 2 nationally in ethanol production. In 2019 the state had 25 plants with an annual production capacity of 2.5 billion gallons of ethanol. In a 2018 interview, Todd Sneller reflected on the growth of the industry as well as the biggest challenges and wins over the years:

“The constant changes in energy and ethanol policies have consistently been a challenge. The oil industry simply does not want ethanol to take market share despite the fact it is the lowest-cost, cleanest-burning octane enhancer available in the world. The oil industry constantly impedes biofuel development via public policy as well as marketplace impediments, which stem from their control of fuel infrastructure, fuel marketing networks and predatory marketing practices. This challenge was evident since the early 1900s and today is even more evident as the oil industry attempts to manipulate the Renewable Fuel Standard and virtually all fuel-related regulations. The fact that ethanol today comprises 10 percent of the U.S. gasoline market is a success story in itself. However, the potential for using higher-ethanol blends to reduce the toxicity of gasoline, reduce air pollution and mitigate the adverse impacts of gasoline on public health is significant. For that reason, the ethanol sector constantly urges policymakers to embrace the biofuel option as a lower cost, healthier option to conventional fuels.”

A BRIGHT FUTURE FOR BIOFUELS AND VALUE-ADDED AGRICULTURE

Although the last ethanol plant in Nebraska was built in 2008, economic development and innovation did not slow down. Plants continued to expand and manufacture new products with innovative new technologies.

One significant advance in commercial ethanol plant technology included conversion of the corn kernel fiber and other biomass like corn stover into sugars that are fermented into ethanol within existing facilities.

Nebraska is also well-suited to capitalize on the next wave of scientific breakthroughs in the biosciences. There are many opportunities for next-generation companies to evolve in Nebraska, which leads to job creation and strengthening the state’s global leadership in value-added agriculture.

The state sees what economists describe as an economic “bounce” when advantage is taken of the added value as grain is converted to food, fuel, fiber and bio-products. There is enormous potential for biofuels to continue to strengthen the economic health of Nebraska.

TECHNICAL ADVISORS

The relationship between the Nebraska Ethanol Board and the University of Nebraska has played an important role in the evolution of ethanol development in Nebraska. Essential research on the use of ethanol, ethanol technology and ethanol co-products and processes has been conducted at the University of Nebraska for nearly 50 years with support from the Nebraska Ethanol Board.

The role of a technical advisor was initially established in the Nebraska Ethanol Board's enabling legislation in 1971. Technical advisors like Dr. William Scheller (1971-1996) have made important contributions by assisting the board with technical expertise and resources.

In November 2014, Dr. Hunter Flodman joined the Nebraska Ethanol Board as the technical advisor replacing Dr. James Hendrix. One of several contributions that Dr. Flodman brought to the board was training plant employees on ethanol advancements by collaborating with the University of Nebraska's Manufacturing Extension Partnership. These courses, titled "Process Control Essentials," provided employees with hands-on experience operating and tuning loops using pilot-scale equipment in controlled settings where several different methods and control structures were explored.

Technical Advisors to the Nebraska ethanol development program:

- Dr. William Scheller (1971-1996)
- Dr. James Eakman (1996-2002)
- Dr. James Hendrix (2002-2014)
- Dr. Hunter Flodman (2014-present)

SUMMARY OF ETHANOL ARCHIVES

- University of Nebraska-Lincoln Love Library
 - The library has archives and collections related to ethanol in Nebraska. Search key words: Ethanol, Scheller, Nebraska Ethanol Board, Chemurgy, Ag Products Industrial Utilization Committee (APIUC) and Gasohol.
- Nebraska Historical Society
 - Record Group # 139, which includes files and records from 1971 to 1995
- Nebraska History Museum
 - Archived files show up under key words: chemurgy, gasohol and ethanol
- Nebraska Ethanol Board
 - Files are based on the board's retention schedule, and are stored within the office.

STATUTORY LANGUAGE

2012 Ethanol Development Act

66-1330. Act, how cited Sections 66-1330 to 66-1348 shall be known and may be cited as the Ethanol Development Act. Credits: Laws 1986, LB 1230, § 1; Laws 1987, LB 279, § 1; Laws 1989, LB 587, § 1; Laws 1992, LB 754, § 1; Laws 1993, LB 364, § 1; Laws 1995, LB 377, § 1; Laws 2001, LB 536, § 1; Laws 2004, LB 479, § 2. 66-1331.

STATUTE NOTES

The below compilation of state statutory citations focuses predominantly on biofuels laws in effect January 1, 1970 through December 31, 2013. It is intended to serve as a researcher-friendly inventory of state laws by providing the formal title of relevant legislation, the standard legal citation for each statute, the applicability of the statute (ethanol, biodiesel, or both), and a brief description of the law. Some statutes and regulations listed do not specifically relate to biofuels, but are included because of their complementary relationship to the evolution of biofuels law in the state. These statutes are placed in reverse chronological order using the date of the most recent amendment to the statute. Many biofuels laws were enacted as amendments to previously passed laws.

Title	Citation	Applicability	Description
Reasonable rates required	(2012) NEB. REV. STAT. § 70-655	Ethanol	Requires state power districts to establish fixed rates for ethanol supplied by the district that are both fair and reasonable.
Ethanol Development Act	(2012) NEB. REV. STAT. §§ 66-1330 TO 66-1349	Ethanol	Declares a state goal of expanding the use of state commodities for ethanol production. Creates the Agricultural Alcohol Fuel Tax Fund and the Ethanol Production Incentive Cash Fund to provide financial incentives for ethanol use and production, as well as the Ethanol Board to oversee the use and distribution of these funds.
Carriers; transportation companies	(2012) NEB. REV. STAT. § 66-525	Both	Requires any person/company transporting motor fuels, including ethanol and biodiesel, within the state to file monthly reports with the Department of Transportation disclosing how much of each fuel they have handled and where it was shipped to.
Alternative Fuel, defined	(2011) NEB. REV. STAT. § 60-306	Both	Alternative fuel is defined to specifically exclude ethanol and biodiesel.
Natural Resources Committee	(2010) NEB. REV. STAT. § 50-501		
Invest Nebraska Act; Application	(2005) NEB. REV. STAT. § 77-5536	Ethanol	Prohibits taxpayers from receiving benefits under the Invest Nebraska Act if they are receiving incentives under the Ethanol Development Act.
Joint Public Power Authority Act	(2005) NEB. REV. STAT. §§ 70-1401 TO 70-1423	Ethanol	Allows state power districts to work jointly with other public power district in the production and/or distribution of ethanol.
Plants, systems, and works	(2005) NEB. REV. STAT. § 70-667	Ethanol	State power districts that operate ethanol production or distribution facilities are granted the right to exercise eminent domain, so long as it is not for development of a private facility.
Alienation of district property	(2005) NEB. REV. STAT. § 70-646.01	Ethanol	Allows a state power district to sell or lease their ethanol production or distribution facility to a private person, firm, or corporation.
Indebtedness of power districts	(2005) NEB. REV. STAT. §§ 70-631 , 70-632 , & 70-636	Ethanol	Allows state power district to take on debt which is payable upon the revenue and profits from their ethanol producing systems.
Joint exercise of powers by district	(2005) NEB. REV. STAT. §§ 70-628.01 TO 70-628.04	Ethanol	Allows state power districts to join with other districts, municipalities, public agencies, cooperatives or corporations for the production and distribution of ethanol.
Ethanol systems authorized	(2005) NEB. REV. STAT. § 70-626	Ethanol	Allows a state power district to own, construct, reconstruct, buy, lease, improve, extend, manage, use or operate any ethanol production or distribution system within or beyond the power district.
Stored fuel; payment of tax	(2004) NEB. REV. STAT. § 66-496	Both	Ethanol and biodiesel are not subject to tax until they are loaded for shipment or delivery to a destination in the state.
Wheat Development Board; Declaration of policy	(1988) NEB. REV. STAT. § 2-2309	Ethanol	Part of the duties of the Wheat Development, Utilization, and Marketing Board is to help develop programs that aid the development of ethanol production.
Grain Sorghum Development Board; Declaration of policy	(1986) NEB. REV. STAT. § 2-4011	Ethanol	Part of the duties of the Grain Sorghum Development, Utilization, and Marketing Board is to help develop programs that aid the development of ethanol production.
Ethanol product and distribution; legislative findings	(1986) NEB. REV. STAT. § 70-601.01	Ethanol	Declares the state's objective to further ethanol production and distribution through the use of the public power industry.
Corn Development Board; Declaration of policy	(1986) NEB. REV. STAT. § 2-3622	Ethanol	Part of the duties of the Corn Development, Utilization, and Marketing Board is to help develop programs that aid the development of ethanol production.
Motor fuel dispensers; label requirements	(1985) NEB. REV. STAT. § 66-1214	Ethanol	Blended fuels containing more than 1% of ethanol must be labeled to notify the consumer of that fact.

END