

# Iowa's Original Ethanol Debate: The Power Alcohol Movement of 1933–1934

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IOWA is perhaps best known to the rest of the nation for two things: corn and politics. Iowa's prestige for the productivity of its farms dates from the state's earliest days. Iowa's fame for politics also has a long history, although many Americans in the twenty-first century associate the state's political influence with the Iowa caucuses, which became the first test for presidential hopefuls beginning in the 1970s.<sup>1</sup> When Iowa's crucial role in choosing presidential candidates was combined with its enormous corn production, ethanol – the name given to ethyl alcohol that is often produced from grain (typically corn) and used as a liquid transportation fuel – became central to the state's history.<sup>2</sup>

Iowa has consistently led the nation in ethanol production. In 2016 Iowa was forecast to produce almost 3.9 billion gallons of ethanol for fuel – far and away the most of any state, nearly double

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1. On the history of the Iowa caucuses, see John C. Skipper, *The Iowa Caucuses: First Tests of Presidential Aspiration, 1972–2008* (Jefferson, NC, 2010); and Hugh Winebrenner and Dennis J. Goldford, *The Iowa Precinct Caucuses: The Making of a Media Event*, 3rd ed. (Iowa City, 2010). Iowans also played crucial roles at the federal level, especially in setting agricultural policy, during the decades from 1890 to 1940. Four Iowans – James Wilson, Edwin Meredith, Henry C. Wallace, and Henry A. Wallace – served as U.S. secretary of agriculture during that era.

2. Ethyl alcohol is produced by the fermentation of sugars by yeasts. It can be produced from many sources, although corn has been the predominant feedstock for ethanol production in the United States.

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the production of second-place Nebraska.<sup>3</sup> Ethanol became one of Iowa's major industries by the early twenty-first century, generating 43,000 jobs and approximately 3.5 percent of the state's gross domestic product, according to industry advocates.<sup>4</sup> Ethanol has received substantial political support over the years, ranging from tax breaks in the late 1970s to the 2005 Renewable Fuel Standard's nationwide mandate for ethanol-gasoline blends.

Both Congress and presidential administrations supported ethanol during this period, largely for political reasons. In the late 1970s, for instance, President Jimmy Carter launched a nationwide ethanol program as part of an effort to woo Iowa voters during the 1980 presidential election. The ethanol question dominated Iowa's presidential contests, leading candidates from both parties to support ethanol in the hope of winning the crucial Iowa caucuses. One reporter joked during the 2008 primaries that once presidential aspirants arrived in Iowa to campaign, "one of their first orders of business was bowing to the ethanol gods."<sup>5</sup> In short, Iowa has been central to the nation's great debate over ethanol over the past 40 years.

Debate over ethanol and biofuels sharply divided Iowans and other Americans concerned about energy policies during this era. Supporters portrayed ethanol as a miraculous fuel that could promote energy independence by weaning the nation off of foreign oil. Ethanol, supporters claimed, would clean the air while supporting the nation's farmers. In contrast, ethanol's detractors portrayed the fuel—and government subsidies for it—as a political boondoggle. Ethanol did little to help the environment, detractors noted, and shifted large sums of taxpayer dollars into the pockets of agribusiness corporations and their lobbyists.<sup>6</sup> Ethanol debates

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3. Chris Buckner, "U.S. Ethanol Plant Capacity Increases for Third Consecutive Year," *U. S. Energy Information Administration*, 8/10/2016, [www.eia.gov](http://www.eia.gov).

4. Iowa Renewable Fuels Association, "Ethanol and the Economy," <http://iowarfa.org/ethanol-center/ethanol-facts/ethanol-and-the-economy/>.

5. Bill Lambrecht, "Political Road Gets Rockier for Ethanol," *St. Louis Post-Dispatch*, 7/22/2007.

6. The literature debating ethanol and other biofuels is voluminous and growing. For a brief overview, see Daniel Yergin, *The Quest: Energy, Security, and the Remaking of the Modern World*, rev. ed. (New York, 2012), 649–70. A supportive but slightly dated approach is in Hal Bernton, William Kovarik, and Scott Sklar, *The Forbidden Fuel: A History of Power Alcohol*, new ed. (Lincoln, NE, 2010).

crossed party lines, often pitting midwestern and rural politicians – both Democrats and Republicans – against representatives of metropolitan areas or oil- and gas-producing regions.

Yet for all the debate over ethanol in recent decades, there has been a surprising amnesia about alcohol fuels in Iowa *before* the 1970s energy crises. Both sides of the ethanol debate have forgotten about alcohol fuel's long history in Iowa and have failed to learn from previous efforts to promote alcohol fuels. This is part of a larger amnesia about the complex history of energy use and alternatives to oil and gas in the United States. As Alexis Madrigal notes, "There's almost no institutional memory of what happened before the energy crises of the '70s."<sup>7</sup> This article describes Iowa's first major debate over ethanol, a movement – known as the power alcohol movement – to legislate alcohol-gasoline blends in the 1930s, a time when power alcohol, like ethanol today, was the focus of vigorous debate in Des Moines and Washington, D.C., that pitted farmers and their representatives against gasoline consumers and oil companies.

The 1933–1934 power alcohol debate was a significant moment in Iowa's twentieth-century industrial and agricultural history. Although the state ultimately did not pass a law mandating alcohol-gasoline blends, the movement fused farm interests, state politicians, and researchers into a powerful interest group. That coalition would later prove crucial to the creation of Iowa's agrochemical industrial complex. The power alcohol movement also highlights the key role that several Iowans played in setting national agricultural and energy policy in the 1930s. Henry A. Wallace's contributions to the New Deal are well known, but his initial support for alcohol fuels as a form of farm relief has been little discussed by historians. The power alcohol movement was Wallace's final attempt to find new markets for corn before fully embracing supply reduction strategies through the Agricultural Adjustment Administration. Less well known but also important was chemical engineer Leo Christensen, an Iowa State College professor and tireless booster for power alcohol. Christensen coordinated power alcohol's diverse advocates in the 1930s. In 1934 he coauthored an influential book, *Power Alcohol and Farm Relief*,

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7. Alexis Madrigal, *Powering the Dream: The History and Promise of Green Technology* (Cambridge, MA, 2011), 1.

that made a case for power alcohol as technically feasible and politically necessary.<sup>8</sup> The outlines of Iowa's later biofuel debates originated in the 1933–1934 power alcohol movement.

Iowa's power alcohol movement is also significant within the longer history of alcohol fuels in the United States. Historians have portrayed the push for power alcohol in the 1930s as an interesting precursor to the serious ethanol policy that was launched in the 1970s. Other historians have discussed the demand for federal power alcohol legislation in those years but have overlooked Iowa's key role in launching the movement to legislate alcohol-gasoline blends.<sup>9</sup> Iowa's debate was not a curious sideline or an isolated local example; it marked an important turning point in the history of alcohol fuels in the United States, which stretched back into the nineteenth century and continues well into the twenty-first.

The 1930s movement stands out as the last moment when nineteenth-century agrarian rhetoric was central to arguments for alcohol fuel from grain. Farmers in the 1930s were keenly aware of the energy transition on the farm that was replacing horses with cars and tractors. Thus, they framed the argument for alcohol fuel in terms of an old agrarian demand that farmers needed protective legislation to ameliorate the costs of technological change. Iowa's power alcohol debate was also an origin point for legislation mandating alcohol-gasoline blends. The idea that legislation should require that motor fuel contain a certain percentage of alcohol gained national attention in the 1930s in the wake of Iowa's debate. The idea circulated among ethanol boosters for decades before finally becoming law in the early twenty-first century with the Renewable Fuel Standard. Finally, the power alcohol debate in Iowa highlights how energy and agricultural policymaking has often involved regional or interstate conflict based on resource production. After the 1970s energy crises, rhetoric about

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8. Leo M. Christensen, Ralph M. Hixon, and Ellis I. Fulmer, *Power Alcohol and Farm Relief* (New York, 1934), 19.

9. Bernton et al., *Forbidden Fuel*; August W. Giebelhaus, "Farming for Fuel: The Alcohol Motor Fuel Movement of the 1930s," *Agricultural History* 54 (1980), 173–84; David E. Wright, "Alcohol Wrecks a Marriage: The Farm Chemurgic Movement and the USDA in the Alcohol Fuels Campaign in the Spring of 1933," *Agricultural History* 67 (1993), 36–66.

national energy independence or energy security has tended to obscure important regional differences within the United States regarding energy policies. Those differences were at the center of the 1933–1934 debate, which pitted midwestern farm interests against the oil and gas producers based in other regions. Interestingly, many of those interstate conflicts may reappear in the twenty-first century as a result of the shale revolution’s dramatic increase in U.S. oil production, which has raised difficult questions about which regions should benefit from federal energy policy. Similar questions were at the heart of the 1930s power alcohol debate.

USING ALCOHOL as fuel had a long history prior to the 1930s. In the middle of the nineteenth century, Americans used blends of alcohol and other liquids — often turpentine — to fuel lamps for lighting. Fuels known as “burning fluids,” or camphene, used in alcohol lamps, gave off a brighter light than tallow candles and were significantly cheaper than whale oil. Unfortunately, they were highly explosive.<sup>10</sup> With the development of the internal-combustion engine in the late nineteenth century, alcohol was held out as a potential fuel for the new motor. Although alcohol fuel was overshadowed by gasoline as the fuel of choice for internal-combustion engines, the door never fully closed on alternative fuels in the early decades of the twentieth century. Calls to use alcohol as a fuel — either in its pure form or blended with gasoline — arose whenever there were concerns that gasoline might run out or when surplus crops sent prices down and farmers sought new markets for their harvests.<sup>11</sup> During the 1920s, several companies attempted to market alcohol fuels or gasoline-alcohol blends, but the blends were rendered uneconomical by cheap gasoline from newly opened wells in the mid-continent oil

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10. Christopher Jones, *Routes of Power: Energy and Modern America* (Cambridge, MA, 2014), 93. On the history of camphene and burning fluids, see Harold F. Williamson and Arnold R. Daum, *The American Petroleum Industry: The Age of Illumination, 1859–1899* (Evanston, IL, 1959), 27–42; and Loris S. Russell, *A Heritage of Light: Lamps and Lighting in the Early Canadian Home* (Toronto, 1968), 93–110.

11. Bernton et al., *Forbidden Fuel*, 8; Daniel Yergin, *The Prize: The Epic Quest for Oil, Money and Power* (New York, 2009), 6–7; Giebelhaus, “Farming for Fuel,” 174; Tom McCarthy, *Auto Mania: Cars, Consumers, and the Environment* (New Haven, CT, 2007), 47–48.

fields. The discovery that tetraethyl lead could be added to gasoline to prevent it from knocking (pre-igniting in the cylinder) killed demand for alcohol as an octane booster in the 1920s.<sup>12</sup> By the early 1930s, alcohol fuels were considered technically feasible but economically unpromising.

At the same time, the United States was undergoing a transformation as motive power shifted from animals and steam engines to gasoline-powered automobiles, tractors, trucks, and buses. As historian Daniel Yergin writes, the years following World War I witnessed "the motorization of the American people."<sup>13</sup> Iowa was hardly exempt from this process. By 1931, Iowa had over 700,000 registered passenger cars and consumed over 364 million gallons of gasoline annually.<sup>14</sup> Less noticed but equally important was the marked decline in the demand for animals to supply power in cities and on farms. During the 1920s, Americans destroyed over six million horses and mules.<sup>15</sup>

The shift from animal power to engine power had profound effects on American farming. As farm animals gave way to tractors and cars, land that had previously been used for pasture was freed up for grain production. During the 1920s, approximately 21 million acres of farmland shifted from growing feed for animals to producing commodities for the market.<sup>16</sup> But fewer animals on American farms and in American cities meant less

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12. Giebelhaus, "Farming for Fuel," 174–75; Alan L. Olmstead and Paul Rhode, "The Farm Energy Crisis of 1920," *Agricultural History* 62 (1988), 48–60; McCarthy, *Auto Mania*, 48–49.

13. Yergin, *The Prize*, 191; Olmstead and Rhode, "The Farm Energy Crisis of 1920," 48–49. For other overviews of the shift toward automobiles and internal combustion engines in U.S. history, see Martin V. Melosi, *Coping with Abundance: Energy and Environment in Industrial America* (New York, 1985), 103–12; McCarthy, *Auto Mania*; David E. Nye, *Consuming Power: A Social History of American Energies* (Cambridge, MA, 1998), 175–83; and Christopher W. Wells, *Car Country: An Environmental History* (Seattle, 2012).

14. "Use of Alcohol from Farm Products in Motor Fuel," S. Doc. No. 73-57, at 41 (1933).

15. Z. R. Pettet, *The Farm Horse* (Washington, DC, 1933), 7; David M. Kennedy, *Freedom from Fear: The American People in Depression and War, 1929–1945* (New York, 1999), 17. See also Ann Norton Greene, *Horses at Work: Harnessing Power in Industrial America* (Cambridge, MA, 2008), 270–73; and Clay McShane and Joel A. Tarr, *The Horse in the City: Living Machines in the Nineteenth Century* (Baltimore, 2007).

16. Kennedy, *Freedom from Fear*, 17; Greene, *Horses at Work*, 273.

demand for feed, exacerbating the glut of grain that lowered crop prices throughout the 1920s and 1930s. Prices for agricultural products dropped throughout the 1920s and then fell precipitously at the beginning of the Great Depression.<sup>17</sup> Although the farm problem of the 1920s and early 1930s was multifaceted, many observers at the time blamed gasoline-powered engines for farmers' woes. For instance, a 1933 photo in the *Des Moines Register* captured this sentiment by showing a farmer driving a tractor with the caption, "They displaced horses, but they don't eat the resulting surplus of feed."<sup>18</sup> Farmers, like most Americans, eagerly embraced the internal-combustion engine but were also keenly aware of how it disrupted the older farm economy.

Power alcohol offered the alluring prospect that crops could be converted into alcohol fuel and farms could return to the old days of growing fuel for the animals – or machines, in this case – that worked on the farm. As an Iowa newspaper editorial put it, "Instead of having our horses eat the corn we can make the tractor eat it."<sup>19</sup> Farmers and their allies also framed a pro-power alcohol argument in terms of a debt owed by petroleum. As oil and gas displaced agricultural products as fuel, farmers contended that oil and gas owed something in return to farmers and rural America. As a longtime farmer recalled, "Petroleum products first began to crowd out agricultural products when the kerosene lamp succeeded the tallow candle, and they have been at it ever since. . . . Today, when the suggestion is made that petroleum products pay back to the farming industry a small part of what it has robbed them of . . . a hulabaloo goes up from one end of the country to the other, and thousands of dollars are spent in propaganda against such a proposition."<sup>20</sup> American farmers in the 1920s and

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17. For an overview of the farm situation in the 1920s and 1930s, see R. Douglas Hurt, *American Agriculture: A Brief History*, rev. ed. (West Lafayette, IN, 2002), 221–330; idem, *Problems of Plenty: The American Farmer in the Twentieth Century* (Chicago, 2002), 41–96; and Theodore Saloutos, *The American Farmer and the New Deal* (Ames, 1982). For the situation in Iowa specifically, see Dorothy Schwieder, "Rural Iowa in the 1920s: Conflict and Continuity," and Joseph Frazier Wall, "The Iowa Farmer in Crisis, 1920–1936," *Annals of Iowa* 47 (1983), 104–27. Both are reprinted in Marvin Bergman, ed., *Iowa History Reader* (Iowa City, 2008), 327–46.

18. "Federal Opinion on Alcohol-Gas," *Des Moines Register*, 5/15/1933.

19. L. A. Brunsting, "The Quiet Hour," *Sioux Center News*, 2/24/1938.

20. Rolfe Arrow, letter to the editor, *Humboldt Independent*, 8/15/1933.

'30s had witnessed a wholesale transformation of motive power on their farms. It was impossible for them to deny the benefits of gasoline-powered tractors and cars, but they were keenly aware of the costs of the transition in terms of destroyed animals and falling crop prices. Alcohol fuels held out the possibility of regaining some of what gasoline had taken away.

Another factor motivating support for alcohol fuels in the 1930s was concern that gasoline supplies would run out in the near future. That worry was as old as the oil industry. Fears of depletion had stalked the petroleum trade since its birth in the mid-nineteenth century. In the early decades of the twentieth century, there were gasoline shortages in some regions, especially as demand for automobile fuel surged ahead of refining capabilities. Fears of a so-called gasoline famine were endemic in the 1900s and 1910s.<sup>21</sup> By the 1920s and early 1930s, however, refining breakthroughs that increased gasoline production and falling demand due to the depression alleviated immediate fears of gasoline shortages. Nonetheless, many observers fretted about depletion even in the midst of low prices during the 1930s. Their fears were driven less by rational analysis of markets and supplies than by a commonsense notion that oil was a nonrenewable resource that must run out at some point. For instance, advocates of power alcohol described the nation's oil and gas as a "national reserve" that was constantly being depleted. In contrast, crops were a "national income of energy" or a renewable resource that could be replenished each season.<sup>22</sup>

The technical feasibility of using alcohol as a fuel, the shift from animal to motor power, and fears of oil depletion were the deep factors driving interest in power alcohol in the 1920s and '30s. But it was the collapse of crop prices in the early 1930s that spurred serious discussion of mandating alcohol fuels and led to Iowa's proposed power alcohol legislation in the 1930s. Average commodity prices dropped 37 percent between 1929 and 1933 while farmers' gross income dropped 52 percent.<sup>23</sup> In 1933 the Iowa Farmers Grain Dealers Association described the farm crisis

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21. Yergin, *The Prize*, 95–96; McCarthy, *Auto Mania*, 17–18.

22. Christensen et al., *Power Alcohol and Farm Relief*, 19.

23. Hurt, *Problems of Plenty*, 63.



as “the greatest emergency the state has ever seen.”<sup>24</sup> It was in this context of acute crisis that legislation mandating the use of alcohol fuel was first proposed in Iowa.

By the early 1930s, then, Iowa farmers were both dependent on gasoline-powered machinery and reeling from a long-term agricultural depression that had slashed commodity prices. Out of this vortex came the power alcohol movement, a popular but diffuse campaign to mandate that the nation’s gasoline supply be blended with alcohol derived from American-grown crops. The proposal was intended primarily as a means of providing economic relief to struggling farmers by creating a lucrative new market for their harvests.<sup>25</sup>

LEGISLATION supporting alcohol-gasoline blends cropped up in several midwestern states during the 1930s, but Iowa was the clear leader of the movement. Iowa’s interest in power alcohol began with a study by researchers at Iowa State College (now Iowa State University). In late 1932 several professors at Iowa State began investigating the feasibility of using a blend of 8 percent ethyl alcohol, 2 percent of a blending agent such as benzene, and 90 percent gasoline as a motor fuel. The study brought together faculty from chemistry, mechanical engineering, chemical engineering, and agricultural economics. These researchers were convinced that the food market for agricultural production would not expand in the near future, so alternative markets were needed to avoid ongoing agricultural depression. They also were intrigued by evidence that alcohol-gasoline blends were already being used successfully in several other countries.<sup>26</sup> Early tests found that blended fuels containing 10 to 20 percent alcohol had better anti-knock properties than pure gasoline (that is, it was less likely to pre-ignite in the combustion chamber). The researchers’ main

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24. “Grain Dealers Ask Aid Action,” *Des Moines Register*, 1/27/1933.

25. Giebelhaus, “Farming for Fuel,” 173, 175–76.

26. Alan I Marcus and Erik Lokensgard, “The Chemical Engineers of Iowa State College,” *Annals of Iowa* 48 (1986), 198; “Study Surplus Control Plan,” *Des Moines Register*, 1/1/1933; “New Motor Fuel Is Tested Here,” *Ames Daily Tribune-Times*, 1/3/1933; Wright, “Alcohol Wrecks a Marriage,” 46–47. Wright argues that a conference on alcohol fuels at Iowa State on December 10, 1932, marked the birth of the 1930s power alcohol movement.

emphasis, however, was the fuel's ability to use up excess corn supplies and relieve the farm crisis.<sup>27</sup>

It is not surprising that Iowa's power alcohol plan was hatched at Iowa State College. In the early 1930s Iowa State was a hothouse for collaboration between engineering and agricultural sciences. Engineering faculty and agricultural researchers worked on parallel tracks in most universities at the time, often competing for scarce funding during the depression. Yet Iowa State College developed a "highly unusual" and very productive collaboration between the two fields. Practically, the harmony between engineering and agriculture found an outlet in the work of chemical engineers who eagerly promoted a new chemical industry based on agricultural products. Throughout the 1920s, chemical engineering faculty experimented with various ways to turn agricultural waste into useful products. Experiments included turning corncobs into chemicals such as acetone, oxalic acid, furfural, and even plastics. Iowa State's chemical engineers were also savvy promoters of their research. They recognized that ongoing funding and public support for their investigations depended on publicizing their work to the state's major industries and highlighting the industrial possibilities of Iowa's abundant agricultural waste products. Thus, Iowa State College researchers approached the alcohol fuel issue with the confidence borne of a decade of experimenting across disciplinary lines to create industrial products from farm output.<sup>28</sup> Building on the researchers' initial findings, Iowa legislators quickly brought the issue to the state capital.

In the first days of 1933, Iowa politicians took the research coming from Ames and pulled it into the orbit of state politics. Power alcohol legislation found fertile ground in Iowa's 45th General Assembly. An unprecedented Democratic majority had entered office on the coattails of Roosevelt's landslide election.

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27. "State College Scientists Striving to Develop Production Technique for Manufacture of New Motor Fuel to Use Nation's Surplus Corn," *Ames Daily Tribune-Times*, 1/4/1933.

28. Marcus and Lokensgard, "The Chemical Engineers of Iowa State College," 177-205. David Wright notes that Iowa State College's researchers were part of a loose, nationwide coalition of agricultural scientists working in the 1920s to fuse agriculture and chemistry. Wright, "Alcohol Wrecks a Marriage," 40.

Patrick Bauer describes the 1932 election in Iowa as one in which “Democratic candidates were elected to positions that had been held by an almost unbroken line of Republicans since before the Civil War.”<sup>29</sup> Reversing decades of Republican dominance of Iowa’s General Assembly, Democrats controlled Iowa’s House of Representatives with a 77–31 majority; the Iowa Senate was evenly split between the parties, with the Democratic lieutenant governor breaking tie votes; and Democrat Clyde Herring occupied the governor’s mansion, only the second Democratic governor in Iowa since the Civil War. That wholesale shift in Iowa’s political culture created a context in which new and more radical ideas for farm relief, such as power alcohol, received more consideration than they had in earlier eras. Due to the farm crisis, the political situation in Iowa in 1932 and 1933 “had reached the point where [leaders] were ready to risk a change.”<sup>30</sup>

Iowa State researchers had shown that alcohol-gasoline blends were technically feasible, but it remained unclear whether there would be a market for them given the low price of oil and customers’ familiarity with straight gasoline. As a solution, state lawmakers considered mandating that alcohol derived from Iowa’s surplus corn be blended into gasoline. A legal mandate would solve alcohol fuel’s economic problems by instantly creating a market for the fuel regardless of cost. Iowa state senators Frank Byers of Linn County and Fred Nelson of Story County, both Republicans, outlined a proposed bill. They were motivated primarily by the belief that, if passed, such a bill “would absorb the corn surplus.” Yet they acknowledged that any legislation would be effective only if it could reach beyond Iowa. Eventually, the U.S. Congress would need to adopt a similar proposal nationwide to make a serious dent in the country’s corn surplus.<sup>31</sup> Thus, when Iowa’s General Assembly convened on January 9, 1933, the alcohol fuel issue was poised to be one of the year’s most contentious legislative matters.

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29. Patrick B. Bauer, “Farm Mortgage Relief Legislation in Iowa during the Great Depression,” *Annals of Iowa* 50 (1989), 28.

30. C. C. Clifton, “Democrats to Rule Iowa House,” *Des Moines Register*, 11/10/1933; Earle D. Ross, *Iowa Agriculture: An Historical Survey* (Iowa City, 1951), 167. See also 1933 *Iowa House Journal*.

31. “Propose Bill on Motor Fuel,” *Oelwein Daily Register*, 1/7/1933.

Support for power alcohol legislation came from a coalition of farmers, agricultural scientists, and politicians representing rural interests. The foremost supporters of power alcohol were scientists and engineers at midwestern universities who believed that converting agricultural surpluses into fuel could solve the farm crisis. These scientists were supported by Corn Belt farmers who were always eager to find new markets for their products, organizations such as the Farm Bureau that represented farmers' interests in the halls of power, and politicians who sought farmers' votes.

Opposition to the power alcohol plan developed more slowly, but once it became clear that possible legislation would mandate an alcohol fuel blend, the petroleum industry coordinated a powerful counterattack. Nationally, the petroleum industry in the early 1930s was organized through the American Petroleum Institute (API). Facing low oil prices and rising taxes in 1932, including a new federal excise tax on gasoline, the API focused on lowering state and local gasoline taxes. Many states had raised gasoline taxes, or were considering doing so, to make up for budget shortfalls during the Great Depression. The API formed a new industries committee meant to "protect the petroleum industry from and relieve it of unjust burdens resulting from discriminatory taxation or adverse legislation."<sup>32</sup> When the power alcohol bill was first considered in Iowa, then, the petroleum industry was already keenly concerned about new state taxes and regulations on gasoline and well organized to lobby against them.

Within Iowa, petroleum business interests were defended by the Iowa Petroleum Association (IPA). That organization was formed in 1921 — it was originally the Iowa Independent Oil Men's Association — and was made up primarily of jobbers. By 1932, the IPA was working closely with other state petroleum organizations and groups representing drivers' interests to fight against new state and local taxes. For instance, at a meeting in February 1932 a speaker warned IPA members that state gasoline taxes

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32. "Gasoline Taxes Must Come Down" (editorial), *Oil and Gas Journal*, 6/9/1932, 32; "National Petroleum Association Convention Asks Government Economies and Tax Relief," *Oil and Gas Journal*, 9/22/1932, 11; Andrew M. Rowley, "A.P.I. Convention Had Many Interesting Phases with Tense Period of Political Maneuvering," *Oil and Gas Journal*, 11/24/1932, 31.

were “the fastest growing tax in history” and opened the door to an “orgy of fraud” by gasoline bootleggers.<sup>33</sup> Also opposed to the power alcohol plan were the nation’s automobile clubs, such as the American Automobile Association, which saw themselves as defenders of gasoline consumers.<sup>34</sup>

As word spread that a law requiring alcohol fuel to be blended into Iowa’s gasoline supply was brewing in the General Assembly, newspapers around the state began reporting on the issue. Many of the state’s editorial pages strongly supported the proposal. The *Ames Daily Tribune-Times* called it “most interesting and perhaps most fruitful of real benefit for Iowa.” The *Sumner Gazette* noted that “nothing which has been announced for some time has appealed so much to the popular imagination, according to conversation heard in the past two weeks.” News of the benefits of alcohol-gasoline blends spread statewide in mid-January when the *Des Moines Register’s* farm editor explained how his own car benefited from the fuel. He described better acceleration from the blended fuel and encouraged its use across the state, writing, “Use of this blend the last few days in my own car has impressed me with its merit.”<sup>35</sup>

Some intrepid Iowans took matters into their own hands and started mixing regular radiator alcohol into their gasoline after reading about the technical success of alcohol-gasoline blends. Iowa State faculty rushed to remind people that radiator alcohol contained too much water and should not be blended with gasoline outside of a laboratory for fear of harming automobile engines.<sup>36</sup>

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33. “Warns of Great Tax Scandal in Gasoline Levies,” *Ames Daily Tribune-Times*, 2/19/1932.

34. “Iowa Oil Jobbers Form Independent Association,” *Petroleum Age*, 12/15/1921, 35; “Davenport Made Director of Association,” *Davenport Democrat and Leader*, 2/21/1929; Wright, “Alcohol Wrecks a Marriage,” 59.

35. “Scanning the News,” *Ames Daily Tribune-Times*, 1/9/1933; “Alcohol from Corn as a Motor Fuel,” *Sumner Gazette*, 1/12/1933; J. S. Russell, “Corn Alcohol Gas Is Proving Efficient Fuel,” *Des Moines Register*, 1/15/1933. On the *Des Moines Register* as the primary statewide newspaper in Iowa, see William B. Friedrichs, “The Newspaper That Captured a State: A History of the *Des Moines Register*, 1849–1985,” *Annals of Iowa* 54 (1995), 303–37.

36. “Radiator Alcohol Is Not Good Motor Fuel,” *Ames Daily Tribune-Times*, 2/9/1933.

Bills supporting Iowa's power alcohol movement were quickly drafted and brought before the General Assembly. The legislation required two stages: first, the state needed to pass laws permitting the manufacture of industrial alcohol (alcohol unsuitable for human consumption), which had been banned during Prohibition. Second, legislators needed to tackle the specific mechanism by which alcohol fuel would be mandated. Dealing with the first problem was straightforward. In late January the Iowa House of Representatives overwhelmingly passed a bill that allowed for the manufacture of industrial alcohol. Observers noted the irony that the president of the state's Woman's Christian Temperance Union had offered the traditional prayer before the legislative session opened. On February 3, the Iowa Senate easily passed the bill, and Governor Herring signed it into law the following week.<sup>37</sup>

The second phase of legislation, determining exactly how an alcohol fuel mandate would work, proved far more difficult. While the General Assembly was in session, several powerful voices in Iowa politics weighed in with their support for an alcohol fuel mandate. First was the formidable Farm Bureau, which endorsed alcohol fuels in late January. The Farm Bureau's annual platform called for the production of new products, including alcohol fuels, from Iowa's agricultural crops.<sup>38</sup> Next to weigh in was Henry A. Wallace, who was among the nation's most influential voices on agricultural matters. His father had been U.S. Secretary of Agriculture in the Harding and Coolidge administrations, and he held the same position in the incoming Roosevelt administration. In addition, the Wallace family's farm journal, *Wallaces' Farmer*, was an influential voice in the agricultural community in Iowa and the larger Midwest. Speaking to the Iowa General Assembly on January 31, Wallace advocated power alcohol derived from corn as one important tool for getting the

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37. "Ia. Moves to Open Way for Manufacture of Alcohol in State," *Ames Daily Tribune-Times*, 1/27/1933; Rider Richmond, "Progress Rapid in Legislature," *Des Moines Register*, 1/29/1933; "Events of Week at State House in Des Moines," *Humboldt Republican*, 2/3/1933; "Alcohol Bill Is Passed 43 to 6 by Iowa Senate," *Mason City Globe-Gazette*, 2/3/1933; "Farm Aid Tops Assembly Week," *Mason City Globe-Gazette*, 2/11/1933.

38. "Resolutions Drawn by Farm Bureau," *Des Moines Register*, 1/20/1933.

nation's farmers out of the deep financial furrow of the Great Depression.<sup>39</sup>

Wallace had been investigating the power alcohol plan for several months and had met with Iowa State researchers. In August of the previous year, he had written a column in *Wallaces' Farmer* claiming, "The chances are ten to one that the automobiles of our children and grandchildren will be run to a considerable extent with alcohol made from corn." Converting corn into alcohol fuel would be a boon to Iowa, Wallace argued. "We should not send all of our automobile money out of the state. If we can grow one-fourth of our motor fuel at home, let's get ready to do it."<sup>40</sup>

In December 1932 Wallace included the power alcohol plan as part of the domestic allotment farm relief plan being crafted in Congress. Mandating alcohol-gasoline blends was proposed as a useful way to help corn farmers in Iowa and Illinois who sold corn to the market rather than feeding it to hogs. Mandating that some portion of the corn crop be converted into alcohol fuel would lessen the depths of the cuts to hog production. Wallace acknowledged that the power alcohol plan might harm oil-producing states in the name of farm relief: "The oil producers of the southwest would undoubtedly be temporarily somewhat damaged, but the benefit done to the corn farmers would be much greater than the damage done to the oil producers."<sup>41</sup> Initially, Wallace framed the 1933-1934 power alcohol debate as an issue of interstate competition rather than national energy policy.

Momentum seemed to be on the side of alcohol fuel. The key bill mandating that alcohol be mixed into Iowa's gasoline supply was introduced in the Iowa Senate on February 9. The complicated bill would have required that all gasoline sold in Iowa be blended with alcohol produced from Iowa crops at a percentage set by a new executive council that would monitor annual harvests to determine how much of a surplus existed. A state alcohol administrator would be charged with permitting new distilleries and ensuring that they did not make more than 10 percent profit.

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39. "Wallace Talks to Legislature," *Oelwein Daily Register*, 1/31/1933.

40. Henry A. Wallace, "Odds and Ends," *Wallaces' Farmer*, 8/6/1932.

41. Henry A. Wallace, "Voluntary Allotment Plan," *Wallaces' Farmer*, 12/24/1932.

As proposed, the bill was technocratic and punitive. It would have instantly transformed the state's gasoline supply and endowed the new alcohol administrator and executive council with sweeping power to control the state's agricultural and energy industries.<sup>42</sup>

Criticism of the proposed law appeared immediately in some Iowa newspapers. The *Mason City Globe-Gazette*, for instance, worried that the plan would raise gasoline costs for consumers and might harm engines.<sup>43</sup> In the national press, *Business Week* weighed in with sharp criticism, describing Iowa's entire power alcohol plan as "among the more scatterbrained proposals put forward in the general anxiety over the plight of the farmer." The article's author argued that diluting gasoline with alcohol made no financial sense. "What this scheme comes down to is the dilution of gasoline, selling for 5¢ at the refineries, with an inferior liquid fuel costing five times as much per gallon."<sup>44</sup> Opponents of the alcohol gasoline mandate spoke on behalf of the petroleum industry and, more broadly, Iowa's gasoline consumers who were more worried about the price they paid at the pump than about supporting farmers.

In February supporters of power alcohol ramped up their lobbying on behalf of the bill. Researchers at Iowa State College, who had initiated alcohol fuel research months earlier, moved quickly to form a committee to promote the plan statewide. Ames was to be the center of "a statewide educational campaign" on behalf of the power alcohol bill. Supporters of the bill from northwestern Iowa organized a caravan to Des Moines to demonstrate the bill's widespread support in rural Iowa. Proponents of power alcohol legislation also pointed to foreign nations, such as Germany, Hungary, and Brazil, that had already enacted similar laws. Opponents argued that the situation in those foreign nations did not apply to the United States since it was an oil exporter and such laws were meant to promote national energy

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42. S.F. 227, 45th General Assembly (1933); "Bill to Make Compulsory Mixing Alcohol with Gasoline in Iowa," *Oelwein Daily Register*, 2/9/1933; "Shelves Bill to Create Agents," *Mason City Globe-Gazette*, 2/9/1933; "Farm-Brewed Fuel," *Business Week*, 3/15/1933, 9.

43. "The Observing," *Mason City Globe-Gazette*, 2/3/1933.

44. "Alcogas," *Business Week*, 2/8/1933, 9.



self-sufficiency. Foes of alcohol fuel argued that in the United States, unlike in those nations that mandated alcohol fuels, "there is a great plenty of oil, and there are both an important petroleum industry and a great body of motorists to protest."<sup>45</sup>

In mid-February, Iowa's petroleum industry launched a coordinated critique of the power alcohol bill pending in the General Assembly. In a letter of opposition, the IPA outlined numerous criticisms of the bill. (1) It would raise gasoline prices since alcohol was more expensive to produce than gasoline. (2) Higher gasoline prices would lead many consumers, especially Iowans living near a state border, to buy gasoline outside Iowa. (3) Bootleggers could bring out-of-state gasoline into Iowa and undersell filling stations. (4) As higher prices caused people to cut back on driving, the total amount of gasoline taxes collected would decrease. (5) High-priced gasoline would lead automotive tourists to avoid Iowa, which, in turn, would lead to lower tourism spending. (6) New storage facilities would be needed to keep water out of gasoline (water caused alcohol and gasoline to separate), and the blended fuel would ruin the shellac on carburetor floats. (7) The legislative mandate would use up only 3 percent of the corn crop, so it would not actually help Iowa's farmers much.<sup>46</sup>

Iowa's power alcohol plan was also criticized by the national petroleum industry. The *Oil and Gas Journal*, the main petroleum industry trade publication, reported on Iowa's power alcohol bill throughout early 1933. Early articles focused on technical problems with alcohol-gasoline blends and emphasized that previous efforts to promote alcohol fuels had failed.<sup>47</sup> Once it became clear that the Iowa legislature was seriously considering the power alcohol bill, however, the *Oil and Gas Journal* took a more critical stance. "The petroleum industry needs be concerned," the journal wrote in March 1933, describing Iowa's legislature as barreling ahead with a plan to help farmers despite the costs to the petro-

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45. "Committee Studies Corn Gas Day Plan," *Ames Daily Tribune-Times*, 2/8/1933; "Caravan to Support Alcohol Fuel Planned," *Des Moines Register*, 2/21/1933; "Alcogas," 9.

46. "Oil Men Fight 'Alcohol Gas,'" *Des Moines Register*, 2/19/1933; Giebelhaus, "Farming for Fuel," 177.

47. Robert C. Conine, "Many Fallacies to Arguments Advanced in Favor of Laws Requiring Gasoline-Alcohol Blends," *Oil and Gas Journal*, 2/23/1933, 12, 56.

leum industry and drivers. Reflecting the petroleum industry's national perspective, the *Oil and Gas Journal* argued that a state-by-state approach to power alcohol would not be helpful. Mandating alcohol fuels might make sense in Iowa, but it could unleash a wave of beggar-thy-neighbor state legislation. "The question then resolves itself into whether each . . . state is to set itself apart from the rest of the country and try to live more and more within itself. . . . If practiced to place certain states at a disadvantage, it is possible retaliatory measures will be taken by those states. Maybe Oklahoma will require that every pound of hog lard contain 10 per cent hydrogenated cotton seed oil, or Nevada might say that every package of corn flakes must contain 10 per cent toasted cactus flakes." Overall, the *Oil and Gas Journal* argued, Iowa's power alcohol bill "will mean investing additional capital to produce an inferior motor fuel from a raw material, the price of which is too high even now to compete with petroleum."<sup>48</sup>

Some local newspapers were sympathetic to the petroleum industry's critiques of power alcohol. The *Oelwein Daily Register*, for instance, wrote, "There is no reason why the auto drivers should be penalized for a surplus of corn in the state."<sup>49</sup> Or, as the manager of the Iowa Motor Club summed up its opposition, "It is a plan to tax motorists one or two additional cents a gallon and give this tax to the farmers."<sup>50</sup>

As Iowans learned about the bill and its potential effects, it was clear that it pitted the economic interests of farmers against those of gasoline consumers. Thus, when the bill was first debated in Iowa's General Assembly on February 21, 1933, each side of the power alcohol debate made an impassioned case for or against the bill. Opponents argued that alcohol from grain was expensive to produce and would lead to a rash of engine problems, such as clogged carburetors and fuel lines. Supporters presented evidence from Iowa State College tests showing that cars running the gasoline-alcohol blend got better mileage and performance. They also emphasized how the fuel would help to

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48. W. T. Ziegenhain, "Program of Substituting Alcohol for Gasoline as Motor Fuel Appears to Be Short-Sighted," *Oil and Gas Journal*, 3/2/1933, 10, 37.

49. "Opposing Mixing Alcohol and Gasoline," *Oelwein Daily Register*, 2/23/1933.

50. "Rhoades States Alcohol, Gasoline Mixture False Economy for Agriculture," *Mason City Globe-Gazette*, 2/21/1933.

alleviate the enormous corn surplus that held down commodity prices.<sup>51</sup>

Legislative debate focused on technical questions such as the fuel's performance in automobile engines and potential effects on the corn surplus. For instance, the bill's opponents noted that, because even a nationwide plan to blend 2 percent alcohol into the gasoline supply was expected to raise the price of gasoline by approximately ½ cent, it would be simpler to add a small gasoline tax and use the money to purchase corn and then destroy it.<sup>52</sup>

Some observers felt that the General Assembly's technical debate had drained the life out of an idea that initially resonated with a simple agrarian message. The *Algona Upper Des Moines* newspaper wrote, "It seems that somebody or something is always taking the joy out of life when what Iowa needs worse than anything else is higher prices for hogs and corn." The *Bode Bugle* also described the bill's appeal in simple language: "The farmers want these measures passed. The business people of Iowa favor the idea. It is the one way in which Iowa can do something for herself."<sup>53</sup>

Because of the "heated debate," the House of Representatives did not move on the alcohol fuel bill in the first session; it was pushed back to the second session.<sup>54</sup> During the recess from February 24 to March 6, opponents of the power alcohol bill marshaled their forces and launched a publicity drive urging Iowa legislators to vote no. Rhetoric from the bill's supporters also sharpened over the recess. One farm woman wrote to the *Des Moines Register* to express her belief that it was time for Iowans to look out for their own economic interests. She described the debate as a fight between regional interests, pitting Iowa and the Farm Belt against "the eastern states where the big factories are located" and "the southern states where these big oil men live in luxury."<sup>55</sup>

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51. Giebelhaus, "Farming for Fuel," 176-77; "Alcohol-Gas Plan Argued," *Des Moines Register*, 2/22/1933.

52. "Farm-Brewed Fuel," 14.

53. "News of the State House," *Algona Upper Des Moines*, 2/22/1933; "Increase the Value of Iowa Corn," *Bode Bugle*, 2/24/1933.

54. "On Capitol Hill," *Des Moines Register*, 2/23/1933.

55. "Legislators Urged to Oppose Proposed Gas, Alcohol Bill in Iowa," *Mason City Globe-Gazette*, 3/3/1933; B. L. Caudill, "Make Alcohol for Gasoline?" *Des Moines Register*, 3/5/1933.

Clearly, power alcohol struck an old, agrarian chord among Iowans who saw the debate as one pitting the righteous farmers of the Midwest against the parasitic oil men of the East and South.

As word of Iowa's power alcohol debate spread, however, it became clear that not all farmers supported it. That was especially true when farmers outside Iowa weighed in on the issue. The president of the National Farmers Union, a farmer from Oklahoma, pointed out that many farmers in oil-producing states received royalties for oil wells on their land and opposed anything that would lessen the value of that oil. For such farmers, the union's president argued, "crude oil . . . is a farm crop just as much as cotton or wheat."<sup>56</sup>

When the General Assembly returned from its spring recess on March 6, the power alcohol bill was the first item on the House's calendar.<sup>57</sup> When the bill came up for a vote on March 8, it was defeated by a vote of 48-57. The deciding arguments against the bill were that it was too vague about where grain alcohol would be produced and blended, whether it would come from Iowa crops, and whether such a law would constitute an unfair tax on Iowans. Other legislators favored the idea but believed it would work only if implemented on a nationwide basis and therefore voted against the Iowa bill.<sup>58</sup> Although power alcohol had many vocal supporters in Iowa, they were unable to alleviate concerns about the effect of requiring a significant change in the state's fuel supply.

Many supporters blamed the shadowy machinations of the oil industry for the bill's failure. According to the *Rock Valley Bee*, "The big oil industries got into the game and worked against the measure to the end that it was defeated."<sup>59</sup> There was some truth to the accusation that the oil industry had worked to defeat the Iowa bill and similar ones developed in other states. The American

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56. "Quack Remedy," *Williamsburg Journal-Tribune*, 5/18/1933.

57. "Fuel Measure Awaits House," *Des Moines Register*, 3/6/1933.

58. "Iowa Legislature Votes Down Bill to Mix Alcohol and Gasoline," *Oelwein Daily Register*, 3/8/1933; "Hush, Hopp Discuss Legislation Here at Meeting Saturday," *Malvern Leader*, 3/9/1933; Giebelhaus, "Farming for Fuel," 177. The vote was not partisan; 13 Republicans and 35 Democrats voted aye, while 17 Republicans and 40 Democrats voted nay. 1933 *Iowa House Journal*, iv-vi, 684.

59. "Thinking Out Loud," *Rock Valley Bee*, 3/17/1933.

Petroleum Institute coordinated opposition to the bill by organizing the oil and gas industry as well as other groups representing motorists, such as state auto clubs, to forge a powerful counterpunch to the proposed alcohol fuel mandates.<sup>60</sup>

Opposition to the power alcohol proposals included creative marketing schemes funded by the API. Gas station attendants received mimeographed paperwork to share with drivers discussing the perils of alcohol fuel. Filling stations also received small sample kits with gasoline and alcohol meant to show how the two liquids would separate with the presence of water.<sup>61</sup>

Gasoline consumers — a group that by the mid-1930s included most Iowans — were torn. Given concerns about higher gasoline prices and technical problems associated with alcohol fuels, many motorists likely needed little encouragement from the API to oppose power alcohol. Yet Americans were also deeply suspicious of the oil industry in the wake of the 1920s Teapot Dome scandal and earlier revelations about Standard Oil's monopoly practices.<sup>62</sup>

Behind the scenes, the API and individual oil companies debated how to respond to the power alcohol mandate. There was consensus that the large oil companies would not tolerate proposals such as Iowa's that required a 10 percent blend of alcohol into the gasoline supply, but many companies were open to proposals to blend 1 or 2 percent alcohol if it would alleviate political pressure. Although the prospect of losing a percentage of the national gasoline supply was hardly welcomed, oil companies were well aware that rural gasoline consumption had dropped precipitously during the depression. The loss of sales to alcohol blends might be made up in increased purchasing power among farmers and rural motorists. Standard Oil of New Jersey, for instance, simultaneously lobbied against any national alcohol fuel laws and explored how it could profit if the law was passed.<sup>63</sup>

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60. Giebelhaus, "Farming for Fuel," 177.

61. Christensen et al., *Power Alcohol and Farm Relief*, 141.

62. Yergin, *The Prize*, 194–201.

63. "Farm-Brewed Fuel," 9, 14. See also the relatively positive coverage of the alcohol plans in the *Oil and Gas Journal* in March 1933. "Use of Agricultural Products in the Manufacture of Chemicals to Blend with Motor Fuels," *Oil and Gas Journal*, 3/16/1933, 10–11, 29.

FOLLOWING the power alcohol bill's failure in early March, Iowans who supported a mandate for power alcohol turned their attention to Washington, D.C. They hoped a nationwide bill similar to the one rejected in Iowa would solve the farm problem. In part, supporters realized that Iowa alone was too small of a gasoline market to make a dent in the nation's agricultural glut. A report by Iowa State College economists in late March confirmed that the state's plan for mandating alcohol fuel would have had no significant effect on the price of corn. Only a nationwide program would consume enough surplus to significantly raise the price of corn.<sup>64</sup>

Confirming that Iowa politicians hoped to shift the power alcohol issue to the federal government, on March 22 the Iowa General Assembly passed a resolution encouraging the federal government to "enact legislation tending to promote and develop the production of grain or ethyl alcohol to be used as a blend with petroleum products as a motor fuel." The General Assembly also asked Congress to add an import duty on blackstrap molasses—the primary feedstock for industrial alcohol production—to make it equal to the price of corn.<sup>65</sup> Newspapers echoed the General Assembly's support for a nationwide alcohol fuel plan. According to one editorial, "It might be hard for one state alone to make a success of the venture, but if the mixture could be used nationally, there is no question but that it would use up the surplus of farm products."<sup>66</sup>

It was not surprising that Iowa politicians turned to the federal government to solve the power alcohol debate. During the spring of 1933, the eyes of Iowans—and most Americans—were transfixed on Washington, where the Roosevelt administration was preparing to take power. Roosevelt had promised swift, decisive action upon taking the oath of office, and many Iowans that spring pondered whether a nationwide alcohol fuel bill might be in the cards of the New Deal.

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64. "State's Action Termed Futile," *Des Moines Register*, 3/29/1933.

65. "Senate Concurrent Resolution No. 21," 1933 *Iowa House Journal*, 938-39; "State Senate Asks Congress for an Import Duty on Black Strap," *Oelwein Daily Register*, 3/22/1933.

66. "Thinking Out Loud."

Other states had followed Iowa's lead in pushing for alcohol fuel bills in early 1933.<sup>67</sup> On Iowa's eastern border, a chemist from El Paso, Illinois, named Paul Beshers began promoting a nationwide plan to require alcohol be mixed into the nation's gasoline supply. He modestly called it the Beshers Plan.<sup>68</sup> It electrified farmers in central Illinois and quickly drew condemnation from the eastern business press. *Business Week* mocked Beshers as the "current patron saint of this old scheme in modern dress." Yet Beshers's ambitious plan differed from the one proposed just weeks earlier in Iowa by calling for nationwide legislation rather than a state law. Beshers and his supporters immediately captured the attention of Illinois representatives and senators who brought forth bills in Congress.<sup>69</sup> Yet state officials in Illinois nonetheless looked to Iowa to take the lead on alcohol fuel legislation. In a letter, the director of Illinois's Department of Agriculture wrote, "After we see what Iowa does, we will be in a better position to work out a plan for Illinois."<sup>70</sup>

Other streams of support for alcohol fuel rose up across the Midwest, but the key figure channeling their flow into Washington was an Iowan: Henry A. Wallace. Likely the state's best-known farmer and editor, Wallace had Roosevelt's ear on agricultural matters even before his appointment in late February as U.S. Secretary of Agriculture, the position his father had held under Presidents Harding and Coolidge. Wallace had learned of the power alcohol experiments at Iowa State College months earlier,

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67. Proposals for power alcohol legislation in states beyond Iowa arrived very quickly in early 1933. Yet David Wright points out how Iowa State researchers, especially Leo Christensen, were at the center of many states' power alcohol plans. Wright, "Alcohol Wrecks a Marriage," 51-53.

68. Giebelhaus, "Farming for Fuel," 176; Bernton et al., *Forbidden Fuel*, 17. For an overview of the power alcohol movement in Illinois, see Carol Brockman, "Alcoholized-Gasoline: Fuel for Recovery?" [Illinois Wesleyan University] *Undergraduate Review* 5, no. 1 (1992), 1-9, accessible at <http://digitalcommons.iwu.edu/rev/vol5/iss1/9>.

69. "Farm-Brewed Fuel," 9.

70. Walter McLaughlin to Henry A. Wallace, 7/26/1933, in Alcohol for Fuel—Beshers's Plan 1933-1936 folder, Illinois Department of Agriculture Director's files, Illinois State Archives, Springfield, IL. Note that Director McLaughlin was told this by Clifford Gregory, editor of *The Prairie Farmer*, whom McLaughlin contacted seeking advice about how to reply to Secretary Wallace. Clifford Gregory to Walter McLaughlin, 7/24/1933, *ibid*.

and he encouraged President Roosevelt to give the idea serious consideration as part of his emerging agricultural agenda.<sup>71</sup> As legislation wound its way through congressional committees, Wallace carefully studied alcohol fuel as a potential solution for the farm crisis. Wallace even tried using ten gallons of the fuel in his official federal vehicle.<sup>72</sup>

National debate over the alcohol fuel legislation came to a head in May. Various bills had been introduced in Congress's first session, but none had made it out of committee. In May Wallace went before the Senate Finance Committee to support a bill that appeared more promising. It would increase the federal gasoline tax by one cent per gallon through 1934. The tax would be raised to three cents per gallon after that. If gasoline was mixed with alcohol—in a percentage rising from 1 to 5 percent after 1934—it could avoid the federal gasoline tax altogether.<sup>73</sup>

As it had in Iowa, the API strongly criticized the bill, even though it required half as much alcohol as Iowa's proposed bill. An API spokesman suggested that it would be cheaper and more efficient for every driver to buy five bushels of corn and burn them. The API charged, "The blend legislation . . . was placed on the congressional doorstep after failing of enactment in the legislatures of Iowa, Minnesota, and South Dakota." Iowa representative Otha Wearin countered that Iowa's General Assembly had petitioned Congress to support a nationwide law even though it had rejected it at the state level.<sup>74</sup> The Senate Finance Committee tabled the bill two days later, arguing that it raised questions about whether such a bill could combine new taxes with an alcohol fuel mandate.<sup>75</sup>

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71. "Study Alcohol as 'Farm Aid,'" *Mason City Globe-Gazette*, 2/24/1933.

72. "Wallace Tries Alcohol Fuel," *Mason City Globe-Gazette*, 4/11/1933. David Wright argues that Wallace favored allotment policies by 1933 but supported power alcohol as a means to win over farmers who were skeptical of cutting back production. Wright, "Alcohol Wrecks a Marriage," 43.

73. "Bills Would Force Alcohol as Fuel," *New York Times*, 5/2/1933; Wright, "Alcohol Wrecks a Marriage," 57-61.

74. "Opposition to Alcohol Blends Grows as Higher Federal Tax Bill Is Introduced in Congress," *Oil and Gas Journal*, 5/4/1933, 9; "Alcohol Fuel Bill Attacked," *Des Moines Register*, 5/5/1933.

75. "Puts Off Tax Study on Gasoline Blends," *New York Times*, 5/4/1933; Wright, "Alcohol Wrecks a Marriage," 61.



Alcohol fuel's supporters were heartened by a U.S. Department of Agriculture (USDA) report in mid-May showing that power alcohol was technically feasible and would benefit America's farmers.<sup>76</sup> Iowa's congressional delegation met with Wallace on May 17 to again argue for the importance of a power alcohol bill in Congress. Secretary Wallace remained supportive but noncommittal.<sup>77</sup>

The May debate in Washington, D.C., proved to be the high-water mark for alcohol fuel legislation in the 1930s. While Wallace was reassuring Iowa's congressional delegation that he still supported a power alcohol bill, the New Deal's agricultural program was gathering speed and moving in a very different direction. Laws mandating alcohol fuel blends were predicated on the principle of expanding markets for corn as a means of farm relief. Wallace and President Roosevelt had concluded, on the other hand, that cutting supplies was a more realistic and immediate answer to the farm crisis. To that end, the landmark Agricultural Adjustment Act was passed on May 12, 1933. Working through the Agricultural Adjustment Administration (AAA), the USDA worked with farmers to reduce the output of major agricultural crops, including corn. Although Wallace and the AAA focused immediately on cotton since it was the primary product of the beleaguered South, by the summer of 1933 the AAA's attention was turning to corn farmers.<sup>78</sup>

When Wallace returned to Des Moines in June, he outlined the New Deal's farm relief efforts thus far. While most of Wallace's focus was on cutting production to raise prices, he indicated that he was still considering the power alcohol plan. "We must either cut down production or find new markets at home or abroad. I think the use of alcohol made from corn in a motor fuel blend might offer one outlet for some of our surplus grain so that we could produce a normal corn crop again without upsetting the balance and causing low prices," Wallace told an Iowa audience.<sup>79</sup>

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76. "Federal Opinion on Alcohol-Gas," *Des Moines Register*, 5/15/1933.

77. "Alcohol Gas Parley Held," *Des Moines Register*, 5/18/1933.

78. Hurt, *Problems of Plenty*, 68-80.

79. "Corn, Hog Relief Next: Wallace," *Des Moines Register*, 6/27/1933. David Wright argues that Wallace became convinced in May 1933 that alcohol fuel proposals were "long-term, capital intensive efforts of high political risk when what

Yet the government's emphasis had shifted to prioritize cutting production over mandating new markets. Just as work horses and mules had been replaced by petroleum-powered tractors, national alcohol fuel legislation was soon left behind by the AAA's sweeping program to reduce farm output.

WHILE CONGRESS was considering a nationwide alcohol fuel bill, debate over power alcohol continued in Iowa even after the General Assembly voted down the bill in early March. Only a few days after the alcohol fuel bill was defeated in Des Moines, the Spencer Chamber of Commerce sponsored an event to sell 500 gallons of alcohol-blend gasoline in the hope of convincing drivers that stories about technical problems with the fuel were untrue.<sup>80</sup> Faculty from Iowa State College and local chambers of commerce came together in April to stage a demonstration of the fuel for the General Assembly in Des Moines, as well as local demonstrations in Storm Lake, Fort Dodge, and Garner. Another plan surfaced to encourage use of alcohol-blend fuels in all state-owned vehicles and, ultimately, to reintroduce the failed mandate bill in a later legislative session.<sup>81</sup> Power alcohol's backers in Iowa clearly had not given up hope that their fuel would be supported by consumers and legislation.

The largest of the demonstrations came in May, when filling stations in Ames sponsored a three-day sale of 22,000 gallons of alcohol-blend fuel. The sale was heavily advertised in local newspapers, and the participating filling stations reported high demand. Drivers who filled their tanks during the sale also reported satisfactory results from the new fuel. It was later revealed, however, that much of the so-called corn alcohol produced for these demonstrations was not made from Iowa corn but was distilled instead from blackstrap molasses brought in from Cuba and Louisiana. The few midwestern distilleries capable of producing anhydrous alcohol were unwilling to invest in new equipment

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was needed were short-term, labor intensive interventions in the farm economy around which greater political consensus could be built." Wright, "Alcohol Wrecks a Marriage," 61.

80. "Spencer to Sell 500 Gallons of Corn Alcohol Mar. 10-11," *Sioux County Index*, 3/9/1933.

81. "To Demonstrate Alky-Gas Fuel," *Ames Daily Tribune-Times*, 4/1/1933.

## **FOUND at Last!**

An answer to the question, What to do with the surplus corn raised in Iowa. Iowa State College has the solution and now we have

# **Alcohol-GAS**

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## **CORYELL Premium Gas**

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Advertisement from *Ames Daily Tribune-Times*, 5/2/1933.

without a law ensuring a steady market for the product, so supplies had to be imported from elsewhere. Legislators, stung by the molasses debacle, soon introduced a bill levying a tax of 25 cents per gallon on alcohol produced from blackstrap molasses.<sup>82</sup>

Legislators tried for another alcohol fuel bill in mid-April. That bill would have taxed regular gasoline at five cents per gallon and alcohol-gasoline blends at three cents per gallon, putting the two fuels at parity for consumers. The bill was blocked in a

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82. "Alcohol-Gas Demonstration Wins Supporters for New Motor Fuel," *Ames Daily Tribune-Times*, 5/3/1933; "Alcohol-Gasoline Is Well Received," *Ames Daily Tribune-Times*, 5/9/1933; "The Joker in the Deck" (editorial), *Humboldt Republican*, 6/2/1933; "From Our Exchanges," *Postville Herald*, 8/3/1933; "Blow Is Aimed at Blackstrap," *Des Moines Register*, 11/15/1933.

parliamentary move on the grounds that it was too similar to the failed bill from March.<sup>83</sup>

During the warm summer of 1933, arguments went back and forth over alcohol fuel's performance in automobiles. Iowa State researchers found that the fuel performed well in real-world tests, leading to minor improvements in acceleration and fuel economy. But a major test sponsored by the American Automobile Association found that alcohol-blend fuels decreased mileage. Supporters of alcohol fuel charged that the American Automobile Association test was faulty, citing faulty equipment and the hot, humid conditions of the Virginia test. Congress even considered getting into the testing business that summer, with Illinois congressman Everett Dirksen proposing a long-distance road test of the fuel in cars driving from Washington, D.C., to the Midwest and back. The long-distance road test was delayed several times before it was ultimately canceled.<sup>84</sup>

Alcohol fuel supporters in Iowa launched an increasingly bitter critique of the "oil interests" based outside the region. The *Humboldt Independent* wrote, "Propaganda from the east is now flooding the mails against the alcohol-gasoline fuel for motor vehicles. It is a determined effort on the part of the large refineries to stop the western move for the 'alky-gas' mixture."<sup>85</sup>

Whether alcohol fuel supporters knew it or not, the political campaign to mandate the fuel in Iowa and nationwide had already passed its zenith. By the fall of 1933, the Roosevelt administration had abandoned its support for power alcohol and instead favored immediate crop reductions for farm relief. That fall the AAA launched its hog reduction program by purchasing and then destroying six million hogs. Since hogs were major consumers of corn, slaughtering so many hogs exacerbated the corn glut. So the AAA began a program to immediately reduce the corn crop as well by contracting with farmers to cut production.<sup>86</sup>

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83. "Alcohol and Gasoline Motor Fuel Bill Is Reported to House," *Mason City Globe-Gazette*, 4/15/1933; "New Delegation Boosts Corn Alcohol," *Humboldt Independent*, 4/18/1933.

84. "Hard to Convince," *Terril Record*, 7/6/1933; "Alcohol-Gasoline Fuel Test Delayed," *Des Moines Register*, 9/14/1933.

85. Editorial, *Humboldt Independent*, 8/1/1933.

86. Hurt, *Problems of Plenty*, 76-77. On the politics and policies of the AAA in 1933, especially the corn-hog program, see Van L. Perkins, "The AAA and the

The AAA remained supportive of power alcohol but now reported that “there are practical obstacles to immediate utilization of . . . corn in making alcohol for motor fuel. Federal legislation to this end has been asked, but it may be at least two years before the present domestic manufacturing capacity can be expanded sufficiently to handle more than 100 million bushels of corn a year.”<sup>87</sup> Developing an alcohol fuel industry to soak up excess supply thus moved to the background.

At about the same time, distilleries began ramping up production to meet the demand created by the repeal of Prohibition. Repealing the Eighteenth Amendment, one newspaper noted, “has assured Iowa of a new market for 50,000,000 to 60,000,000 bushels of corn.” The National Recovery Administration distillers code drafted by Secretary Wallace required whisky to be made from corn, which was viewed as Wallace’s effort to protect Iowa’s agricultural interests.<sup>88</sup>

With the AAA focused on cutting back corn production and the opening of a lucrative new market thanks to the repeal of Prohibition, alcohol fuel’s political momentum quickly fizzled out. When the Iowa General Assembly held a special session from November 1933 to March 1934, it took no action on power alcohol. The news was the same from Washington, D.C. When Iowa representative Guy Gillette wrote to his constituents about news from the capital in 1934, he noted, “The corn-alcohol fuel blend, which still has many warm supporters, does not seem to have gained any ground and many of its former supporters have become lukewarm.”<sup>89</sup> National efforts for power alcohol legislation foundered in 1934. In October, leaders of the power alcohol movement announced that they would not seek a bill in the upcoming congressional session because of a smaller than expected

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Politics of Agriculture: Agricultural Policy Formulation in the Fall of 1933,” *Agricultural History* 39 (1965), 220–29; and Roger Lambert, “The Illusion of Participatory Democracy: The AAA Organizes the Corn-Hog Producers,” *Annals of Iowa* 42 (1974), 468–77.

87. “U.S. Tells Why Corn-Hog Program Is Needed,” *Des Moines Register*, 10/8/1933.

88. “Repeal Opens Corn Market,” *Terril Record*, 12/4/1933.

89. Guy Gillette, “Lights from Washington,” *Terril Record*, 4/26/1934; see also “Results Fail to Justify Advocacy of Legislation to Force Motorists to Use Alcohol Blends,” *Oil and Gas Journal*, 3/8/1934, 43, 45.

corn crop that fall and staunch opposition from powerful groups like the American Automobile Association.<sup>90</sup> By early 1935, Secretary Wallace was actively downplaying power alcohol as a farm relief measure. "We contemplate no action further than that we have taken in the last two years," Wallace said. Alcohol fuel was still held out as a long-term possibility but it was no longer considered a tool for immediate farm relief since the AAA's crop reductions had already alleviated the worst problems facing corn farmers.<sup>91</sup>

EVEN AS the political push for power alcohol faded in Des Moines and Washington, another Iowan took up the cause and moved forward with a plan to produce alcohol-blend fuels in the Midwest. Leo Christensen was one of the young chemical engineering faculty at Iowa State College who had worked on the initial alcohol fuel experiments in 1932. He soon emerged as one of Iowa's leading promoters of power alcohol. One newspaper noted how his "honest Danish features glow as he tells the possibilities of the alky blend."<sup>92</sup>

In the summer of 1933 Christensen was among the scientists who observed the American Automobile Association tests that showed lower fuel economy with gasoline-alcohol blends, directly contradicting his own previous experiments. Christensen criticized the tests, arguing that the results were invalid because the test was conducted on an especially hot day with highly volatile gasoline. The real-world tests conducted in Ames, he argued, were a much more accurate demonstration of the fuel's performance.<sup>93</sup>

Traveling to Washington, D.C., Christensen became one of the chief supporters of a nationwide alcohol fuel bill. He later worked with the USDA to collect accurate statistics about power alcohol. He presented his findings to the Senate but could not

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90. "Motor Blend Drive Halted," *Des Moines Register*, 10/7/1934.

91. "Wallace Cool on Alky-Gas Plans," *Muscatine Journal and News-Tribune*, 2/21/1935.

92. Giebelhaus, "Farming for Fuel," 178; "Meeting Called to Build Opinion for Alky Fuel Blends," *Malvern Leader*, 4/26/1934.

93. Bernton et al., *Forbidden Fuel*, 19-20.

convince a Senate subcommittee to bring a national power alcohol bill forward for a vote. Christensen was “somewhat disappointed” but vowed to continue lobbying for national power alcohol.<sup>94</sup>

Frustrated by the lack of political action on power alcohol, Christensen and two fellow Iowa State scientists, Ralph Hixon and Ellis Fulmer, wrote a book manuscript explaining the technical and economic benefits of alcohol fuels. They had difficulty finding a publisher for the treatise. Eventually they took it to William Hale at Dow Chemical, who arranged for it to be published by the Chemical Foundation, the entity created during World War I to hold the patents for chemicals taken from German firms.<sup>95</sup> The book, titled *Power Alcohol and Farm Relief*, was published in 1934.

In the book, Christensen and his coauthors revealed the primary motivations driving power alcohol’s supporters in the 1930s. First, they were propelled by nationalism. Worried that relying on imported agricultural products weakened the United States in times of war and hurt the American farmer, they made replacing imported products with alternatives derived from American farms central to their research agenda. They also worried that the long agricultural depression of the 1920s and early 1930s was causing American farmers to sink into European-style peasantry, fatally undermining democracy. Second, Christensen and his coauthors advocated an early version of resource nationalism and energy independence, contrasting fossil fuels such as coal and petroleum, which were a “national reserve” that was depleted, with the “national income of energy” from photosynthesis. They wrote, “Agriculture stores up energy each year from the rays of the sun; in contrast, all energy secured from coal and petroleum represents a destruction of natural resources which can never be replaced. It is sound national economic policy to utilize this annual income of energy and to conserve the reserve supplies of coal and petroleum.”<sup>96</sup> Like other alcohol fuel proponents in the 1930s, Christensen proceeded from the assumption that American

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94. “Iowan Works on Fuel Law,” *Des Moines Register*, 3/30/1934; “Iowan Ends Fuel Talks,” *Des Moines Register*, 4/17/1934.

95. Bernton et al., *Forbidden Fuel*, 19–20.

96. Christensen et al., *Power Alcohol and Farm Relief*, 19, 177.

supplies of petroleum were an exhaustible resource that would run out in the near future, although he stopped short of predicting when, exactly, oil supplies would run dry.<sup>97</sup>

Most of Christensen's book concerned technical analysis of alcohol fuel's performance in engines and its economic challenges. Christensen argued that the engineering changes that would be required in engines to use pure alcohol as fuel made that option unfeasible at the time. He advocated blends containing 10–20 percent alcohol as an acceptable compromise.<sup>98</sup>

Christensen's political recommendations were relatively conservative, although he did insist that government action was needed to spur the alcohol-fuel industry. He opposed laws mandating specific amounts of alcohol in the gasoline supply. Instead, he recommended altering the federal gasoline tax to make alcohol blends competitively priced with straight gasoline and then letting consumers decide. Yet the need for farm relief compelled immediate action, in his opinion. He suggested that alcohol fuels receive a government subsidy to begin but that such aid should be "eliminated at some future date."<sup>99</sup> These political recommendations never took hold in Des Moines or Washington.

In the absence of political action, Christensen joined William Hale of Dow Chemical and Francis Garvin of the Chemical Foundation as leading advocates of a nationwide movement to use agricultural products, including alcohol fuels, as the basis for a chemical industry. Known as the farm chemurgy movement, this little-remembered fusion of chemical engineering and agricultural sciences was prominent in the 1930s. The chemurgists embraced a "vision of a worldwide, agrichemical revolution from which alcohol would emerge as a renewable, alternative fuel." Farm chemurgy attracted attention from wealthy industrialists such as Henry Ford, who hosted several conferences on the topic.<sup>100</sup>

Although efforts to mandate alcohol fuels via legislation foundered after 1934, Christensen continued his quest to create an alcohol fuel industry by partnering with the Chemical Foun-

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97. *Ibid.*, 33–49.

98. *Ibid.*, 51–52, 67.

99. *Ibid.*, 158–59, 165.

100. Bernton et al., *Forbidden Fuel*, 15. On the farm chemurgy movement, see Wright, "Alcohol Wrecks a Marriage," 36–66.



dation in a business venture. Christensen resigned his position at Iowa State in 1936 to move to Atchison, Kansas, where the Chemical Foundation was building a distillery to produce alcohol for fuel. Christensen personally oversaw construction of the distillery, worked to perfect the distilling process there, and even coordinated a marketing campaign for the fuel, which was marketed throughout the Midwest as Agrol. The Agrol venture had some success in the late 1930s. At its zenith, Agrol was offered at two thousand filling stations across the Midwest.<sup>101</sup>

When the Agrol blend arrived in Iowa filling stations in 1937–1938, there was considerable debate in the press over the fuel's benefits and drawbacks. A March 1938 advertisement for the fuel urged Iowans to use it to support the farm economy: "[Whether or not] you will buy and use an alcohol blend of gasoline is not for us to attempt to dictate but you must admit it is a step in the right direction. After all, in this vicinity we are all farmers, and anything that benefits the farmer benefits all of us." Although the Agrol plant was located in Kansas, Christensen reminded Iowans that they still benefited from it. During the first half of 1938, the plant purchased approximately 125,000 bushels of corn from Iowa farmers and shipped 100,000 gallons of the fuel to Iowa in May 1938 alone.<sup>102</sup>

By early 1938, plans were in the works for a second Agrol distillery to be located in Sioux City, Iowa, even though the original Atchison distillery was struggling to turn a profit. Local boosters encouraged Agrol to expand into Iowa. The *Sioux Center News* described "considerable demand around here for an alcohol blend fuel." The Sioux City Chamber of Commerce led efforts to bring an Agrol distillery to the city. In a radio address, a speaker from the chamber told Sioux City residents that the fate of alcohol fuels rested on their willingness to purchase the fuel once it became available. "Mr. Fleet Owner, Mr. Car Owner, Mrs. Car Owner, will you do your part in this great movement? Have you the interest of America and your own welfare enough at heart so that you will make a real effort to help this movement

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101. Bernton et al., *Forbidden Fuel*, 23–24.

102. *Ibid.*, 8; Giebelhaus, "Farming for Fuel," 181; "Agrol Motor Fuel Alcohol Blend Gasoline" (advertisement), *Boyd's Reporter*, 3/10/1938 (quotation); "Buys 125,000 Bushels Corn," *Des Moines Register*, 6/5/1938.

succeed? Have you the courage to drive from a filling station un-serviced when told that Agrol is not on sale?" Yet plans for the Sioux City plant fell apart in the summer and fall of 1938 as the larger Agrol venture failed. Leo Christensen, who had worked tirelessly for alcohol fuels, both in Iowa and Kansas, returned to his family farm in Nebraska.<sup>103</sup>

POWER ALCOHOL sputtered out in the late 1930s, a victim of cheap oil, coordinated attacks from the oil industry, and farm policies that emphasized reducing supply rather than expanding markets for agricultural products. Yet the end of power alcohol hardly marked the final debate over ethanol in Iowa.

Just a few years after the Agrol experiment failed, Iowa was again at the center of national controversy over alcohol derived from corn. In that case, the issue was not liquid transportation fuels but synthetic rubber. Immediately after the United States entered World War II, the nation grappled with a crippling shortage of rubber because most natural supplies were under Japanese control. Although a U.S. crash program to create synthetic rubber was successful, debate broke out over whether the feedstock for synthetic rubber should come from petroleum, which the oil industry preferred, or alcohol derived from agricultural products. Iowa Senator Guy Gillette demanded that the nation use corn alcohol as a synthetic rubber feedstock, opening a controversial investigation in Congress. The debate pitted "farm rubber" against "monopoly rubber" or "Standard Oil rubber." As in the 1930s power alcohol movement, though, petroleum-based synthetic rubber proved cheaper and more immediately available than alternatives created from farm products.<sup>104</sup>

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103. "Corn Alcohol Parley Today," *Des Moines Register*, 2/12/1938; Giebelhaus, "Farming for Fuel," 182; "News Force," *Sioux Center News*, 2/10/1938; Albert F. Swanson, "Agrol Industry Contracts Corn at 56¢ Per Bu.," *Boydton Reporter*, 4/21/1938; "Young Heads Corn Alcohol Firm," *Des Moines Register*, 9/2/1938; "Biographical Note," Leo M. Christensen Papers Finding Aid, Michigan State University Archives and Special Collections, <http://archives.msu.edu/findaid/174.html>.

104. I. F. Stone, "A People's War—Or Monopoly's?" *The Nation*, 8/1/1942, 85. The fullest account of the World War II synthetic rubber debate is in Mark R. Finlay, *Growing American Rubber: Strategic Plants and the Politics of National Security* (New Brunswick, NJ, 2009), 171–97. See also Keith Orejel, "The Origins of

After a hiatus during the postwar decades, Iowa's ethanol debate roared back to life in the 1970s in response to concerns about pollution from automobiles and, most importantly, the energy crises of the decade. When the nation launched an ambitious effort to cut back on smog and air pollution in the 1970s, Farm Belt politicians recalled the earlier power alcohol debate and suggested alcohol fuels as clean-burning alternatives to leaded gasoline. In the wake of the 1973 Arab oil embargo and the 1978–1979 energy crisis, Iowans urged the nation to adopt ethanol-gasoline mixtures—called gasohol in that era—as a gasoline supply extender and a tool for achieving energy independence. In the early twenty-first century, Iowa's ethanol industry was boosted by the Renewable Fuel Standard (passed in 2005 and updated in 2007), national legislation mandating that ethanol be blended into the nation's gasoline supply.

What lessons can be drawn from Iowa's original ethanol debate? Iowa's early consideration of alcohol fuels established several important precedents that would shape the state's—and the nation's—alcohol fuels policies for the rest of the century. First, the 1930s power alcohol debate revealed that the high cost of alcohol fuels forced them into an uphill battle in their contest for market share with gasoline. Producing alcohol for fuel simply made it more expensive than gasoline in the 1930s.<sup>105</sup> Thus, all the arguments in favor of alcohol fuels faced the difficult challenge of explaining why consumers should pay more for the new fuel.

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the Iowa Development Commission: Agricultural Transformation and Industrial Development in Mid-Twentieth-Century Iowa," *Annals of Iowa* 76 (2017), 56–58.

105. Giebelhaus, "Farming for Fuel," 183. It must be noted that the low price of gasoline in the 1930s was not the result of an unfettered free market, which has never existed for energy sources in the United States. Instead, energy prices have always resulted from a mixture of profit-minded companies and government regulation and oversight. For instance, oil companies benefited from the tax code's oil depletion allowance that gave a significant subsidy to oil producers beginning in 1926. On the lack of a free market in U.S. energy history, see Martin V. Melosi, *Coping with Abundance: Energy and Environment in Industrial America* (New York, 1985), 11; and Paul Sabin, *Crude Politics: The California Oil Market, 1900–1940* (Berkeley, CA, 2005). On the oil depletion allowance, see Peter A. Shulman, "The Making of a Tax Break: The Oil Depletion Allowance, Scientific Taxation, and Natural Resources Policy in the Early Twentieth Century," *Journal of Policy History* 23 (2011), 281–322.

During the 1930s, a few drivers in the Midwest were willing to do so, but it proved impossible to convince most consumers that it was worth paying more at the pump to support farmers. In later decades, namely during the 1970s oil shocks and the early 2000s, ethanol claimed a broader share of the fuel market at moments when high oil prices made alcohol fuels competitive with gasoline. In contrast, oil was abundant and cheap throughout the 1930s, and alcohol fuels never could compete with gasoline on price without changing the tax code.

Second, and closely related, the 1930s power alcohol debate pitted farmers' interests against the concerns of petroleum producers and consumers. There was little doubt that a law mandating use of alcohol fuel would provide a valuable new market for farm crops and perhaps raise commodity prices. But those price increases would be passed on to drivers in the form of higher-priced fuel. That dynamic has persisted in ethanol debates as the number of drivers dwarfs the number of farmers, even in the 1930s and more so today. Yet within the state of Iowa there was something closer to a balance between those interests, which accounts for the state's long advocacy on behalf of alcohol fuels. Asking drivers to pay a bit more at the pump to help farmers resonated in Iowa more than elsewhere in the country. Many Iowans in the 1930s either lived on farms or could reach back a generation or two to recall their own rural roots.

Although the 1930s power alcohol debate established precedents that have lasted for decades in the nation's ethanol policies, there were important differences between the situation in the 1930s and later debates such as the gasohol policies pursued in the wake of the 1970s energy crises and post-1990 ethanol policy. The generation of farmers and drivers who debated alcohol fuels in the early 1930s remembered the transition from animal to engine power. They were keenly aware of what had been gained from their new tractors and automobiles, but they also likely had nostalgic memories of beloved work horses. Arguments for power alcohol in that era were therefore tinged with agrarianism, in this case the demand that distant oil companies owed something to the farmers and their products for all they had displaced.

Additionally, debates over alternatives to oil and gas as motor fuels before the 1970s were not focused on national energy

independence or security, which became central to U.S. energy policies after the 1970s energy crises. Some of power alcohol's most vocal proponents, such as Leo Christensen, certainly anticipated these arguments by fretting that the nation would be dependent on foreign supplies in a time of war. But most Americans had little worry over energy independence in the 1930s when the United States was awash in cheap oil from domestic wells. Instead, arguments over alcohol fuels in that era were regional and emphasized interstate competition. Rhetoric in favor of power alcohol imagined a noble heartland of struggling farmers pitted against a corrupt but powerful eastern and southern elite of oil and gas barons. Not surprisingly, Iowa's power alcohol supporters drew on a deep well of antimonopoly rhetoric in American culture that increasingly focused on so-called big oil by the middle of the twentieth century.

Finally, the 1930s power alcohol debate differed fundamentally from later biofuels arguments in that the environmental benefits and costs of producing transportation fuel from farm crops were not central to the discussion. Beginning in the 1970s and continuing into the twenty-first century, arguments for and against ethanol have hinged on the fuel's environmental trade-offs. That was not the case during the 1930s. In part, the lack of environmental focus during the 1930s reflected that era's thinking about the natural world. Modern environmentalism and concerns about environmental harm from gasoline-powered automobiles did not become widespread until the postwar era.<sup>106</sup> To be sure, some power alcohol proponents anticipated later environmental critiques of the oil and gas regime. Leo Christensen described oil as a finite natural reserve in contrast to alcohol fuels, which he framed as a renewable national income. Other farm chemurgists went further in anticipating environmental arguments. For instance, William Hale argued that gasoline-powered automobiles were already leading to smog and carbon monoxide problems in major cities such as London and New York.<sup>107</sup> Yet that issue never became a focus of the 1930s power alcohol debate,

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106. Samuel P. Hays, *Beauty, Health, and Permanence: Environmental Politics in the United States, 1955–1985* (New York, 1987); Wells, *Car Country*.

107. William J. Hale, *The Farm Chemurgic: Farmward the Star of Destiny Lights Our Way* (Boston, 1934), 149–51.

although it was perhaps a missed opportunity for power alcohol proponents because one of their strongest arguments was that alcohol could replace tetraethyl lead as an octane booster, known even then to be poisonous.

Iowa's first serious debate about the merits of using alcohol derived from corn as transportation fuel occurred in the 1930s. In the short term, the power alcohol movement of the 1930s was a failure. Bills mandating that 10 percent of the state's motor fuel supply come from alcohol failed in the General Assembly, and the Agrol experiment was bankrupt by the end of the decade. But the state's debate over alcohol as a motor fuel was just beginning. Well into the next century, Iowans are still debating the intersection of corn and politics.