

Documentation for zFacts.com

zFacts on ethanol

See yellow **highlights** on the [following page\(s\)](#).

Fact: Average ethanol subsidy, 1982 -- 2006 was 54¢.

Source: DOE "Ethanol Timeline." (Google search this title if you want the complete document.)

Notes: Pages below list the dates of changes in ethanol subsidies. The subsidies are as follows:

1982 40¢
1983 50¢
1884 60¢
1990 54¢
2001 53¢
2003 52¢
2005 51¢

When these values are weighted by the number of years in effect and averaged, the result is 54¢.

Ethanol Timeline

- 1826 Samuel Morey developed an engine that ran on ethanol and turpentine.
- 1860 German engine inventor [Nicholas Otto](#) used ethanol as the fuel in one of his engines. Otto is best known for his development of a modern internal combustion engine (the Otto Cycle) in 1876.
- 1862 The Union Congress put a \$2 per gallon excise tax on ethanol to help pay for the Civil War. Prior to the Civil War, ethanol was a major illuminating oil in the United States. After the tax was imposed, ethanol cost too much to be used this way.
- 1896 Henry Ford built his first automobile, the quadricycle, to run on pure ethanol.
- 1906 Over 50 years after imposing the tax on ethanol, Congress removed it, making ethanol an alternative to gasoline as a motor fuel.
- 1908 Henry Ford produced the Model T. As a flexible fuel vehicle, it could run on ethanol, gasoline, or a combination of the two.
- 1917 - 1918 The need for fuel during World War I drove up ethanol demand to 50-60 million gallons per year.
- 1920's Gasoline became the motor fuel of choice. Standard Oil began adding ethanol to gasoline to increase octane and reduce engine knocking.
- 1930's Fuel ethanol gained a market in the Midwest. Over 2,000 gasoline stations in the Midwest sold gasohol, which was gasoline blended with between 6% and 12% ethanol.
- 1941-1945 Ethanol production for fuel use increased, due to a massive wartime increase in demand for fuel, but most of the increased demand for ethanol was for non-fuel wartime uses.

1945-1978 Once World War II ended, with reduced need for war materials and with the low price of fuel, ethanol use as a fuel was drastically reduced. From the late 1940's until the late 1970's, virtually no commercial fuel ethanol was available anywhere in the U.S.

1974 The first of many legislative actions to promote ethanol as a fuel, the Solar Energy Research, Development, and Demonstration Act led to research and development of the conversion of cellulose and other organic materials (including wastes) into useful energy or fuels. To this day, there is still not a commercial plant using cellulose as the feedstock.

1975 U.S. begins to phase out lead in gasoline. Ethanol becomes more attractive as a possible octane booster for gasoline. The Environmental Protection Agency (EPA) issued the initial regulations requiring reduced levels of lead in gasoline in early 1973. By 1986 no lead was to be allowed in motor gasoline.

1978 The first time gasohol was defined, it was in the Energy Tax Act of 1978. Gasohol was defined as a blend of gasoline with at least 10 percent alcohol by volume, excluding alcohol made from petroleum, natural gas or coal. For this reason, all ethanol to be blended into gasoline is produced from renewable biomass feedstocks. The Federal excise tax on gasoline at the time was 4 cents per gallon. This law amounted to a 40 cents per gallon subsidy for every gallon of ethanol blended into gasoline.

1979

- Marketing of commercial alcohol-blended fuels began. Amoco Oil Company began marketing commercial alcohol-blended fuels, followed by Ashland, Chevron, Beacon, and Texaco.
- About \$1,000,000,000 (\$1 billion) eventually went to biomass related projects from the Interior and Related Agencies Appropriation Act.

1980 - 1984

- 1980 - First U.S. survey of ethanol production was conducted. The survey found fewer than 10 ethanol facilities existed, producing approximately 50 million gallons of ethanol per year. This was a major increase from the late 1950s until the late 1970s, when virtually no fuel ethanol was commercially available.

- Congress enacted a series of tax benefits to ethanol producers and blenders. These benefits encouraged the growth of ethanol production.
- 1980 - The Energy Security Act offered insured loans for

small ethanol producers (less than 1 million gallons per year), up to \$1 million in loan guarantees per project that could cover up to 90 percent of construction costs on an ethanol plant, price guarantees for biomass energy projects, and purchase agreements for biomass energy used by federal agencies.

- 1980 - Congress placed an import fee (tariff) on foreign-produced ethanol. Previously, foreign producers, such as Brazil, were able to ship less expensive ethanol into the United States.
- 1980 - The Gasohol Competition Act banned retaliation against ethanol resellers.
- 1980 - The Crude Windfall Tax Act extended the ethanol-gasoline blend tax credit.

1983

The Surface Transportation Assistance Act increased the ethanol subsidy to **50 cents per gallon.**

1984

- The number of ethanol plants in the U.S. peaked at 163.
- The Tax Reform Act increased the ethanol subsidy to **60 cents per gallon.**

1985

- Many ethanol producers went out of business, despite the subsidies.
- Only 74 of the 163 commercial ethanol plants (45%) remained operating by the end of 1985, producing 595 million gallons of ethanol for the year.
- One reason for producers going out of business was the very low price producers could receive for their ethanol (even with a subsidy of 60 cents per gallon), since the prices of crude oil and gasoline were so low. Despite the very low price of corn, which is the main driver of the cost of producing ethanol, nothing was enough to prevent the high rate of market change.

1988

- Ethanol was first used as an oxygenate in gasoline. Denver, Colorado mandated oxygenated fuels (i.e., fuels containing oxygen) for winter use to control carbon monoxide emissions.
- Other oxygenates added to gasoline included MTBE (Methyl Tertiary Butyl Ether - made from natural gas and petroleum) and ETBE (Ethyl Tertiary Butyl Ether - made from ethanol and petroleum).
- MTBE dominated the market for oxygenates.

1990

- Omnibus Budget Reconciliation Act decreased the ethanol subsidy to **54 cents per gallon of ethanol**
- Ethanol plants began switching from coal to natural gas for power generation and adopting other cost-reducing

technologies.

- An expanding market and the high cost of fructose corn syrup encouraged expansion of wet mill plants that produce the syrup as a by-product of the ethanol production process.

- The Energy Policy Act of 1992 (EPACT) provided for two additional gasoline blends (7.7% and 5.7% ethanol).
 - EPACT also defined ethanol blends with at least 85% ethanol as “alternative transportation fuels.” It also required specified car fleets to begin purchasing alternative fuel vehicles, such as vehicles capable of operating on E-85 (a blend of 85% ethanol and 15% gasoline). The EPACT also provided tax deductions for purchasing (or converting) a vehicle to that could use an alternative fuel such as E-85 and for installing equipment to dispense alternative fuels.
- 1992
- The Clean Air Act Amendments mandated the *winter-time use* of oxygenated fuels in 39 major carbon monoxide non attainment areas (areas where EPA emissions standards for carbon dioxide had not been met) and required year-round use of oxygenates in 9 severe ozone non attainment areas in 1995.
 - MTBE was still the primary oxygenate used in the U.S.

- The excise tax exemption and income tax credits were extended to ethanol blenders producing ETBE.
 - The EPA began requiring the use of reformulated gasoline year round in metropolitan areas with the most smog.
- 1995

1995 - 1996 With a poor corn crop and the doubling of corn prices in the mid-1990s to \$5 a bushel, some States passed subsidies to keep the ethanol industry solvent.

1997 Major U.S. auto manufacturers began mass production of flexible-fueled vehicle models capable of operating on E-85, gasoline, or both. Despite their ability to use E-85, most of these vehicles used gasoline as their only fuel because of the scarcity of E-85 stations.

1998 The ethanol subsidy is extended through 2007 but will be gradually reduced. The ethanol subsidy of 54 cents per gallon will be reduced gradually to 51 cents per gallon in 2005.

1999 Some States began to pass bans on MTBE use in motor gasoline because traces of it were showing up in drinking water sources, presumably from leaking gasoline storage tanks. Because ethanol and ETBE are the main alternatives to MTBE as an oxygenate in gasoline, these bans will increase the need for ethanol as they go into effect.

- 2000 EPA recommended that MTBE should be phased out nationally.
- 2001 A 1998 law reduced the ethanol subsidy to **53 cents per gallon starting January 1, 2001.**
- 2002
- U.S. automakers continued to produce large numbers of E-85-capable vehicles to meet federal regulations that require a certain percentage of fleet vehicles to be capable of running on alternative fuels. Over 3 million of these vehicles were in use.
 - At the same time, several States were encouraging fueling stations to sell E-85.
 - With only 169 stations in the U.S. selling E-85, most E-85 capable vehicles are still operating on gasoline instead of E-85.
- 2003
- A 1998 law reduced the ethanol subsidy to 52 cents per gallon starting January 1, 2003.
 - As of October 2003, a total of 18 States had passed legislation that will ban MTBE - but none of the states that are major users of MTBE, such as CA, CT, KY, MO and NY have their ban in effect yet.
 - California began switching from MTBE to ethanol to make reformulated gasoline, resulting in a significant increase in ethanol demand by mid-year, even though the California MTBE ban does not go into effect until January 1, 2004.
 - New York and Connecticut are planning for increased ethanol use in late 2003 because MTBE bans in their states will also take effect on January 1, 2004.

The technology to make ethanol from sugar and corn predates the automobile.

TODAY

- Corn is the main feedstock for ethanol in the United States - due to its abundance and low price. The starch in the corn must first be turned into sugar, which is then fermented into alcohol.
- Sugar cane and sugar beets are the feedstocks most frequently used in producing ethanol around the world. Since alcohol is created by fermenting sugar, sugar crops are the easiest to convert into alcohol. Brazil, the country with the world's largest ethanol production, makes most of its ethanol this way.
- Other crops or wastes from food or beverage processes are used as the feedstock at some ethanol plants. These feedstocks include wheat, milo (or sorghum), potatoes, and beverage wastes. Today's Ethanol Production Has Valuable Byproducts
- Animal Feed: Feed grain for animals is produced from the residue left over after the production of the alcohol.
- Corn syrup: An expanding market and the high cost of fructose corn syrup

encouraged expansion of wet mill plants that produce the syrup as a by-product of the ethanol production process.

- Two ways to make ethanol byproducts from corn: Ethanol production plants using corn as the feedstock either use a wet or dry mill process.

- Wet mill processing plants produce more valuable by-products than the dry mill process. In addition to the ethanol, wet mill plants produce:
 - Corn gluten meal (which can be used as a natural herbicide or as a high protein supplement in animal feeds)
 - Corn gluten feed (also used as animal feed)
 - Corn germ meal
 - Corn oil
 - Carbon dioxide (CO₂ for soft drinks or dried ice) and
 - High fructose corn syrups.
- Wet mill plants also cost substantially more to build and have higher operating costs than dry mill processing plants, and hence are usually much bigger than dry mill plants in order to achieve economies of scale.
- Dry mill processing plants are usually much smaller than wet mill plants, are easier and simpler to build and run, and typically only sell ethanol and distillers dried grains for animal feed. Some dry mill plants also capture and sell CO₂ as a byproduct, but most do not.

Still In The Future

Cellulose: There has yet to be a commercial plant using cellulose from agricultural or municipal wastes as a feedstock, instead of the more traditional feedstocks. The ethanol from the cellulose process is complex and costly and is still currently in the research and development stage. In recent years, pilot plants have proven the technical feasibility. Several North American companies have considered building factories that would convert the cellulose from organic plant wastes into ethanol.

Laws That Helped Make Ethanol A Transportation Fuel

Public Law

Number & Name

93-473: Solar Energy Research, Development, and Demonstration Act

95-618: Energy Tax Act

96-126: Interior and Related Agencies Appropriation Act

96-223: Crude Oil Windfall Tax Act

96-294: Energy Security Act

96-304: Supplemental Appropriation and Rescission Act

96-493: Gasohol Competition Act

97-424: Surface Transportation Assistance Act

98-369: Deficit Reduction Act

99-499: Superfund Amendments & Reauthorization Act

100-647: Technical and Miscellaneous Revenue Act

101-508: Omnibus Budget Reconciliation Act

102-486: Energy Policy Act

103-66: Omnibus Budget Reconciliation Act of 1993

105-34: Taxpayer Relief Act of 1997

105-178: Transportation Equity Act for the 21st Century

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