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Biomass Energy: An Agricultural Role in Pollution Control?

by

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BIOMASS ENERGY: AN AGRICULTURAL ROLE IN POLLUTION CONTROL?

*Allan M. Richards**

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I. INTRODUCTION

Modern energy sources are important to American agriculture because significant amounts of energy are consumed at every stage of production and processing. While largely undeveloped, agriculture also has tremendous potential as a producer of energy—not from coincidental deposits of coal under farms, or oil and gas resources, or even the wind, but from the very stuff of agricultural production—biomass.¹ Agriculture began to play a role in national energy strategy during the 1970s, a time when agricultural fuel

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1. U.S. DEP'T OF ENERGY, NATIONAL ENERGY STRATEGY 127 (1991) (providing a complete listing of liquid fuels from biomass: 1) methanol fuels produced by gasifying biomass; 2) ethanol fuels derived from corn, grains, or other crops, from wood and wood wastes, or from municipal wastes; 3) hydrogen fuels derived from biomass by gasification, from water by electrolysis (using electricity), from water-splitting bacteria, or by chemical-membrane reactions; 4) gasoline derived from biomass—wood, agricultural crops, or biomass wastes—through the use of high temperature refining technologies currently under development; and 5) diesel fuel produced from such biomass oil crops as vegetable and microalgae oils) [hereinafter NATIONAL ENERGY STRATEGY].

production expanded slowly.² A new national energy strategy emerged in 1992.³ This Article focuses on the continued role agriculture should play in shaping the national energy strategy, with particular emphasis on agriculture's potential as a producer of energy from biomass for off-farm use. The author's contention is that the use of greater amounts of biomass fuels will reduce air pollution.

II. UNITED STATES BIOMASS ENERGY USED FOR REDUCTION OF AIR POLLUTION

A. Biomass: An Energy Source for Pollution Control

Since Congress enacted the Biomass Energy and Alcohol Fuels Act of 1980,⁴ the agricultural community has had a defined role in the production of energy supplies.⁵ This legislation united the Secretaries of Energy and Agriculture in implementing the Biomass Act. After fifteen years, the results suggest that biomass has gained greater acceptance as a fuel source. The Energy Policy Act, coupled with this change in attitude, has enhanced the quest for renewable fuels—including biomass energy—leading toward even greater dependence on biomass fuels.

Biomass⁶ is defined, for the purposes of Congressional research and development funding, as "any organic matter which is available on a renewable basis, including agricultural crops and agricultural wastes and residues, wood and wood wastes and residues, animal wastes, municipal wastes, and aquatic plants."⁷ Biomass fuel is defined as "gaseous, liquid, or solid fuel produced by conversion of biomass."⁸ The term "biomass energy" includes biomass fuel, energy, or steam from the various processes using biomass.⁹

2. CONG. RESEARCH SERV., U.S. CONG., ALCOHOL FUELS I (1991) (indicating that 40 million gallons of ethanol fuel were sold in 1979, approximately 800 million gallons were sold each year from 1985 through 1988, and only 750 million gallons were sold in 1989; if 2.5 gallons of ethanol are produced from each bushel of corn, 750 million gallons represent 300 million bushels of corn; states with major dollar sales include Illinois, Ohio, Indiana, Texas, and Kentucky; states where ethanol represents a significant percentage of the market include Nebraska, Illinois, Iowa, Kentucky, and New Mexico; states requiring ethanol consumption for pollution reasons are Colorado, Arizona, Nevada, and New Mexico).

3. See The Energy Policy Act of 1992, Pub. L. No. 102-486, 106 Stat. 2776 (codified at 42 U.S.C. § 13201) [hereinafter the Energy Policy Act].

4. See The Biomass Energy & Alcohol Fuels Act of 1980, Pub. L. No. 96-294, 94 Stat. 683 (1980) (codified as amended at 42 U.S.C. §§ 8801-8871 (1994)) [hereinafter Biomass Act].

5. See 42 U.S.C. §§ 8801-8871 (1994).

6. The terms biomass, alcohol, ethanol, methanol, ETBE, MTBE, and even gasohol are sometimes confused and misinterpreted. Biomass is legislatively defined and should be thought of as the primary concept, whereas, alcohol, ethanol, methane, ETBE, and MTBE are by-products produced using different feedstock or technical processes. This paper generally uses the term biomass, but in certain instances reference is to biomass fuels or ethanol.

7. 42 U.S.C. § 8802(2)(A) (1994).

8. *Id.* § 8802(3).

9. See *id.* § 8802(4)(A)-(B).

Except for the use of municipal wastes, this form of energy is dependent upon agricultural crops for production.¹⁰

Biomass fuel—which includes alcohol, methanol, and ethanol—is produced and is a suitable substance “as a fuel or as a substitute for petroleum or petrochemical feedstock.”¹¹ The term biomass is used in the broadest sense when Congress refers to energy produced for powerplants, industry, or electric generation;¹² whereas the definition of biomass is more narrowly and specifically defined for the financial assistance programs.¹³ A closer look at the purpose and goals of the legislation will assist Congress in setting its future agenda. As set forth in the Biomass and Alcohol Fuels Act of 1980, Congressional energy policy seeks increased biomass energy production. A decade ago, Congress declared:

(1) [The] dependence of the United States on imported petroleum and natural gas must be reduced by all economically and environmentally feasible means, including the use of biomass energy resources; and (2) a national program for increased production and use of biomass energy that does not impair the Nation’s ability to produce food and fiber on a sustainable basis for domestic and export use must be formulated and implemented within a multiple-use framework¹⁴

The fear of dependence on foreign oil is still quite high in the United States. The nation’s energy needs have been measured in terms of consumption and production, rather than in terms of conservation. Congress reasoned that a “national program” was to be developed to increase the production and use of biomass energy.¹⁵ This new emphasis on biomass was to be developed without harming the nation’s agricultural production of food, fiber, and feed supply.¹⁶ Once formulated, the biomass energy program was to be implemented by loan guarantees backed by the “full faith and credit” of the United States.¹⁷ These loan guarantees supported research and construction of production facilities and were the first indications of the government’s intention to look at biomass fuels as one of the nation’s energy resources.¹⁸ This legislation forms the foundation for agriculture to become a supplier of energy.

10. *Id.*

11. *Id.* § 8802(1).

12. *See id.* § 8802(5)(b).

13. *See id.* § 8802(1).

14. *Id.* § 8801.

15. *Id.* § 8801(2).

16. *See id.*

17. *Id.* § 5919(b)(4).

18. NEIL E. HARL, AGRICULTURAL LAW §§ 99.01-99.03 (1995) (outlining the legislative history of the Biomass Act); *see also* Biomass Act, *supra* note 4, § 8803 (providing a Congressional directive authorizing \$460 million for the Secretary of Agriculture and \$460 million for the Secretary of Energy to implement the Biomass Act beginning October 1, 1980).

Biomass fuels are important in the overall national energy scheme because of their potential as (1) a direct liquid fuel supply, (2) an additive to gasoline, (3) a by-product of municipal and other wastes, and (4) a cleaner fuel source.¹⁹ If the reader accepts biomass fuel as a possible energy resource for the future, then it is important to view the entire energy picture as it has developed and as it continues to take shape. Biomass fuels are rather modern in the history of energy and energy law; they should prove successful for pollution control.

B. *Energy Issues in America*

1. *The Structure of Energy Law*

Energy law²⁰ emerged as a separate legal discipline²¹ less than 20 years ago, as legal educators and social scientists began thinking and writing²² of

19. See generally RESOURCES, COMMUNITY, AND ECON. DEV. DIV., U.S. GENERAL ACCOUNTING OFFICE, ENERGY: BIBLIOGRAPHY OF GAO DOCUMENTS JANUARY 1986-DECEMBER 1989 (1990); NATIONAL AGRIC. LIBRARY, U.S. DEP'T OF AGRIC., GASOHOL JANUARY 1983-SEPTEMBER 1990 (1990) (providing a bibliography of documents); NATIONAL AGRIC. LIBRARY, U.S. DEP'T OF AGRIC., BIOGAS AND ALCOHOLS FROM BIOMASS: JANUARY 1986-SEPTEMBER 1990 (1990) (providing a bibliography of documents).

20. Several sources are available to researchers wishing to trace the development of energy in the United States. See generally N. CARTER & W. TIERNEY, *The Impact of Automotive Emissions Controls on Future Crude Oil Demand in the United States*, in ENERGY: DEMAND, CONSERVATION, AND INSTITUTIONAL PROBLEMS 450 (Michael S. Macrakis ed. 1974) (providing a chart of energy consumption for past, present, and future use starting in 1800); SVANTE KARLSSON, *OIL AND THE WORLD ORDER* (1986) (following the rise and fall of the control of American oil interests in the international oil market); BENJAMIN T. BROOKS, *PEACE, PLENTY, AND PETROLEUM* (1944) (tracing the history of petroleum and its role in the growth of the United States); HAROLD L. ICKES, *FIGHTIN' OIL* (1943) (explaining oil's contribution to a country's effort to win a war); LUDWELL DENNY, *WE FIGHT FOR OIL* (1928) (explaining the possibility of war unless the United States and Great Britain agree to share in raw materials, especially oil); ANTON MOHR, *THE OIL WAR* (1926) (tracing the history of the political struggle for oil in the world); JOHN G. CLARK, *ENERGY & THE FEDERAL GOVERNMENT: FOSSIL FUEL POLICIES, 1900-1946*, at 381 (1987) (stating that "federal policies toward the mineral fuels from 1900-1946 can be characterized as unsystematic, vague, and eminently minimal"); SAM H. SCHURR & BRUCE C. NETSCHERT, *ENERGY IN THE AMERICAN ECONOMY, 1850-1975* (1960) (providing a better understanding of the country's energy position by studying the past to gain perspective on the present circumstances and by analyzing future prospects and problems); GERALD D. NASH, *U.S. OIL POLICY, 1890-1964* (1968) (analyzing and describing the increased cooperation between government and private enterprise as the impetus for a strong petroleum industry); STOCKHOLM INTERNATIONAL PEACE RESEARCH INST., *OIL AND SECURITY* 91-103 (1974) (providing a definition and listing of various energy sources: wood, coal, oil, natural gas, hydroelectric power, nuclear energy-fission, tar sand, coal liquification and gasification, nuclear energy-fusion, geothermal power, solar energy, wind energy, tidal energy, ocean thermal differences, bioconversion, hydrogen, and methanol); ROBERT H. CONNERY & ROBERT S. GILMOUR, *THE NATIONAL ENERGY PROBLEM* 187 (1974) (listing various governing bodies created to deal with energy issues including: the U.S. Forest Service, 1906; Tennessee Valley Authority, 1933; Environmental Protection Agency, 1969; Federal Power Commission, 1920; Bonneville Power Authority, 1937; and Atomic Energy Commission, 1944); THE BROOKINGS INST., *ENERGY POLICY IN PERSPECTIVE: TODAY'S PROBLEMS, YESTERDAY'S SOLUTIONS* 20-21

(Craufurd D. Goodwin ed. 1981) (describing a move to increase resource development in 1946 by creating a resource development agency in the Department of Interior); EDWARD W. CHESTER, *U.S. OIL POLICY & DIPLOMACY* 335-41 (1983) (listing major events in world petroleum development); IGOR I. KRAVASS & DORIS M. BIEBER, *ENERGY AND CONGRESS: AN ANNOTATED BIBLIOGRAPHY OF CONGRESSIONAL HEARINGS AND REPORTS 1971-1973* (1974); DEPARTMENT OF ENERGY, *UNITED STATES ENERGY POLICY: 1980-1988*, at 108 (1988) (quoting President Reagan: "we support efforts by the private sector to develop alternative energy sources that are economically viable in the Nation's market place"); GLENN MCLOUGHLIN, *MORTGAGING AMERICA'S FUTURE* 18 (1984) (asserting that the Reagan administration had declared "that energy waste programs are near commercialization" and requested termination of funding for research and development); ARABINDA GHOSH, *OPEC, THE PETROLEUM INDUSTRY, AND UNITED STATES ENERGY POLICY* 185-89 (1983) (presenting the Reagan policy of decontrol and increased production).

Energy law is embodied in a series of separate statutes. See National Energy Act of 1978, comprised of the Public Utilities Regulatory Policies Act of 1978, Pub. L. No. 95-617, 92 Stat. 3117 (codified as amended in scattered sections of 15, 16, 30, 42, 43 U.S.C.); Energy Tax Act of 1978, Pub. L. No. 95-618, 92 Stat. 3174 (codified as amended in scattered sections of 23, 24 U.S.C.); National Energy Conservation Policy Act, Pub. L. No. 95-619, 92 Stat. 3206 (codified as amended in scattered sections of 12, 15, 23, 42 U.S.C.); Powerplant and Industrial Fuel Use Act of 1978, Pub. L. No. 95-620, 92 Stat. 3289 (codified as amended in scattered sections of 15, 42, 45 U.S.C.); Natural Gas Policy Act of 1978, Pub. L. No. 95-621, 92 Stat. 3350 (codified as amended at 15 U.S.C. §§ 3301-3432 (1994), 42 U.S.C. § 7255 (1994)); see also Crude Oil Windfall Profits Tax Act of 1980, Pub. L. No. 96-223, 94 Stat. 229 (codified as amended in scattered sections of 17, 19, 26, 42 U.S.C.); Defense Production Act of 1950, 50 U.S.C. §§ 2061-2171 (1994); United States Synthetic Fuels Corporation Act, 42 U.S.C. §§ 8701-8795 (1994); Biomass Energy and Alcohol Fuels Act of 1980, Pub. L. No. 96-294, 94 Stat. 683 (codified as amended in scattered sections of 7, 15, 16, 42 U.S.C.); Renewable Energy Resources Act, 16 U.S.C. §§ 2701-2708 (1994) and 42 U.S.C. §§ 7371-7375 (1994); Solar Energy and Energy Conservation Act, 12 U.S.C. §§ 1451-1723 (1994); Geothermal Energy Act, 30 U.S.C. §§ 1511-1516 (1994); Acid Precipitation Act, 42 U.S.C. §§ 8901-8912 (1994).

21. For a comparative analysis of energy law and its operation in the European Economic Community see JOSEPH P. TOMAIN, *ENERGY LAW* (1981); see also TERENCE DAINITTH & LEIGH HANCHER, *ENERGY STRATEGY IN EUROPE: THE LEGAL FRAMEWORK* (1986) (examining the energy objections adopted by the Community, and the continuing need to update these policies to accommodate national trends).

22. See Lon L. Fuller, *The Forms and Limits of Adjudication*, 92 HARV. L. REV. 353, 395 (1978). An analytical manner of envisioning this process is well described as a "polycentric" process, as many old and emerging ideas, policies, and factors are brought together. A polycentric decision according to Fuller is as follows:

We may visualize this kind of situation by thinking of a spider web. A pull on one strand will distribute tensions after a complicated pattern throughout the web as a whole. Doubling the original pull will, in all likelihood, not simply double each of the resulting tensions but will rather create a different complicated pattern of tensions. This would certainly occur, for example, if the doubled pull caused one or more of the weaker strands to snap. This is a "polycentric" situation because it is "many centered"—each crossing of strands is a distinct center for distributing tensions.

Id.

energy law as a separate discipline. Energy law developed under a vast array of titles and places.²³ The reader may wish to pursue energy law in more detail using the legislation in the late 1970s as a starting point.²⁴

The first major national energy strategy was the work of the Carter Administration, and the effects of that strategy continue to be felt today. The Department of Energy Organization Act²⁵ was an attempt by the Carter Administration to centralize the policy and decision-making authority regarding energy.

Biomass fuel production has a direct impact on the agricultural economy and leads to growth through increased sales of agricultural products. Biomass is increasingly being viewed as beneficial to the environment for

23. See H.R. COMM. ON ENERGY AND COMMERCE, 99TH CONG., 1ST SESS., COMPILATION OF SELECTED ENERGY-RELATED LEGISLATION (Comm. Print 1985) (containing energy-related legislation: Volume I: Oil, Gas, and Nonnuclear Fuels—including: the Trans-Alaska Pipeline, Petroleum Marketing Prices Act, Natural Gas Act, Natural Gas Pipeline Safety Act of 1968, Alaska Natural Gas Transportation Act of 1976, Natural Gas Policy Act of 1978, Powerplant and Industrial Fuel Use Act of 1978, Energy Supply and Environmental Coordination Act of 1974, Energy Security Act, Defense Production Act of 1950; Volume II: Electric and Nuclear Energy—including: Federal Power Act, Public Utility Holding Company Act of 1935, Public Utility Regulatory Policies Act of 1978, Pacific Northwest Electric Power Planning and Conservation Act, Alaska Federal-Civilian Energy Efficiency Swap Act of 1980, Atomic Energy Act of 1954, Uranium Radiation Exposure Remedial Action, Uranium Mill Tailings Radiation Control Act of 1978, West Valley Demonstration Project Act, Low-Level Radioactive Waste Policy Act, Nuclear Regulatory Commission, Nuclear Regulatory Commission Appropriation Authorization for Fiscal Years 1984 and 1985, Nuclear Waste Policy Act of 1982; Volume III: Energy Conservation, Low-Income Assistance, and Related Matters—including: Energy Policy and Conservation Act (relating to automobile fuel efficiency), Title V of Motor Vehicle Information and Cost Savings Act, Emergency Energy Conservation Act of 1979, Energy Conservation and Production Act, National Energy Organization Policy Act, National Energy Extension Service Act, Department of Energy Organization Act, Low-Income Home Energy Assistance Act of 1981; and Volume IV: Miscellaneous Laws—including: Federal Nonnuclear Energy Research and Development Act of 1974, Outer Continental Shelf Lands Act, Agreement on International Energy Program, National Environmental Policy Act of 1969, Title V Administrative Procedure and Judicial Review, Federal Advisory Committee Act, Paperwork Reduction Act).

24. See *supra* note 23.

25. The Department of Energy Organization Act, Pub. L. No. 95-91, 91 Stat. 565 (1977) (codified as amended at 42 U.S.C. §§ 7101-7375 (1994)). The Carter Ten Point Plan is summarized as follows:

- (1) Energy decision making should be centralized;
- (2) Economic growth should be considered with a changing energy plan;
- (3) The environment should be protected;
- (4) Dependence on foreign sources of energy should be reduced;
- (5) Energy policy must be fair and equitable;
- (6) Conservation is the cornerstone of energy policy;
- (7) Prices should reflect costs;
- (8) Government policies must be predictable and certain;
- (9) Scarce fuels should be conserved, but the use of coal increased;
- (10) Unconventional sources of energy are to be developed.

Joseph P. Tomain, *Institutional Conflicts Between Law and Policy*, 22 HOUS. L. REV. 661, 672-75 (1985).

pollution control because of ethanol's higher oxygen content. By replacing gasoline, biomass fuels also help to reduce reliance upon imported oils.

Biomass energy can provide a long-term energy resource. The market for biomass has been guided by actual cost, tax incentives, loan guarantees, and funding for research. Policies set for several years have helped private planning, development, and stability. Finally, a better unconventional source of energy is developing biomass energy, which is a renewable resource. In theory, biomass energy should be a strong factor in the development of energy law.²⁶

As energy law develops, new relationships and responsibilities will develop. It is within existing legal frameworks that principles governing biomass energy will be molded into the law. Biomass energy had its impetus in regulation, but still represents only a minor aspect of energy law. Biomass regulation, presently conducted by a variety of agencies, primarily deals with licensing,²⁷ financial assistance, and taxation.²⁸

During various stages of energy development, political decisions guided the energy industry.²⁹ Policy directives have been, and will continue to be, fundamental in achieving the energy goals of this nation.³⁰ Energy sources should be found that can reduce oil, coal, nuclear, and electric usage.³¹ Lost among the early energy debates was discussion of the potential for alcohol production for automobile fuels.³² Biomass and alcohol fuels, however, are back on the agenda.

The National Energy Strategy³³ was developed through tremendous political effort during the Bush administration.³⁴ The passage of the Energy

26. A bill introduced by Senators Grassley and Daschle would provide tax credits if renewable fuel technologies (including biomass) were used in the production of electricity. See S. 466, 102d Cong., 1st Sess., 137 CONG. REC. S2183 (daily ed. Feb. 21, 1991).

27. See 27 C.F.R. §§ 19.901-19.1008 (1990) (regulating the location, construction, equipment, arrangement, qualification, and operations of distilled spirits plants).

28. Aspects of financial assistance and taxation will not be addressed in this Article, nor will the areas of plant regulation, inspection, and quality issues.

29. See, e.g., RAYMOND C. SCHEPPACH, *Synthetic Fuels*, in ENERGY-POLICY ANALYSIS AND CONGRESSIONAL ACTION 143 (Raymond C. Scheppach & Everett M. Earlich eds. 1982) (discussing the process involved in the formation and evaluation of a proposed bill governing synthetic fuel production and Congress' role therein). For a discussion of pork-barrel distributive politics, pluralism politics, fragmented policy, and veto politics, see ROBERT S. GILMOUR, *THE NATIONAL ENERGY PROBLEM* 184-89 (1974).

30. See generally SOLAR ENERGY RESEARCH INST., *NEW AND RENEWABLE ENERGY IN THE UNITED STATES OF AMERICA* (1981) (including solar, biomass, wind, ocean, hydropower, geothermal, and oil shale).

31. IAN BARBOUR ET AL., *ENERGY AND AMERICAN VALUES* 50-63, 148-51 (1982) (discussing the "hard path" and difficulties in defining alternative energy sources).

32. JOHN ISE, *THE UNITED STATES OIL POLICY* 437-48 (1926) (providing a complete and early discussion of alcohol fuels).

33. See generally Chandler L. Van Orman, *The National Energy Strategy—An Illusive Quest for Energy Security*, 13 ENERGY L.J. 251 (1992) (stating that an energy strategy was needed to achieve a state of "energy security"). See WEBSTER'S NEW WORLD DICTIONARY 1324 (1988) (referring to "strategy" as skill in managing or planning; a definition accepted by this writer is that of employing the full political and psychological powers of the nation to achieve

Policy Act³⁵ marked years of compromise.³⁶ The chief developments for alternate fuels were requirements for alternate fuel vehicles.³⁷ The legislation also gave the Secretary of Energy, along with other related departments, including the Secretary of Agriculture, responsibility for the accomplishment of production goals.³⁸

The effort by the Environmental Protection Agency was a strategy mandating biomass fuels. The EPA viewed biomass products as protecting the environment through emission controls within vehicle fuels and the compliance standards under the Act. The forceful resistance by the historical power structures within the oil industry was brought to bear on the new rules advancing biomass fuel products.³⁹

The use of biomass fuels has always lacked available alternative fuel vehicles mandated by new legislation.⁴⁰ The issue for determination is whether fuel protects the environment. The consideration within the scientific community and their relationship with the political arena was shown during the debate on the Energy Policy Act.⁴¹ The scientific resolution might be years in the future; however, it is recognized that pollution control is vitally important. What better natural reduction in pollution than burning renewable oxygen-based biomass fuels.

2. *Agriculture's Relationship with Biomass Energy*

The agricultural community can see a continuing increase in the importance of agriculture in energy policy. The realization by agricultural representatives that agricultural products could be used successfully as energy has caused them to focus on possible solutions for the future.⁴² The prospects for agricultural production of energy supplies received a big boost from the

a goal); see also THOMAS R. DYE, UNDERSTANDING PUBLIC POLICY 25-45 (1987) (setting forth a model of public policy as that of simplifying, clarifying, and identifying relevant forces, communicating knowledge, directing inquiry, and suggesting explanations).

34. Chandler L. Van Orman, *The National Energy Strategy—An Illusive Quest For Energy Security*, 13 ENERGY L.J. 251, 253 (1992).

35. For an analysis of the Energy Policy Act of 1992, and a prediction of its impact, see Jeffrey D. Watkins & Douglas W. Smith, *The Energy Policy Act of 1992—A Watershed for Competition in the Wholesale Power Market*, 10 YALE J. ON REG. 447 (1993).

36. Jim Rossi, *Lessons from the Procedural Politics of the "Comprehensive" National Energy Policy Act of 1992*, 19 HARV. ENVTL. L. REV. 195, 195-97 (1995).

37. See 42 U.S.C. § 13251 (1994).

38. See § 13254.

39. See *American Petroleum Institute v. EPA*, 52 F.3d 1113, 1118 (D.C. Cir. 1995); see also *Energy Policy Act* 42 U.S.C. § 13252(b)(2)(A-B) (1994) (setting a goal of 10% alternative fuels by 2000 increased to 30% by 2010).

40. Donald F. Santa, Jr. & Patricia J. Beneke, *Federal Natural Gas Policy and the Energy Policy Act of 1992*, 14 ENERGY L.J. 1, 28 (1993).

41. *Id.* at 9-12, 16-18.

42. See *Alcohol Fuel Options and Federal Policies: Hearings Before the Subcomm. on Energy Dev. & Application of the House Comm. on Science & Technology*, 96th Cong., 1st Sess. 67-70 (1979) (statement of Charles E. Grassley, U.S. Representative).

Biomass Act that now serves as supporting legislation for America's future energy agenda.

Energy resources are increasingly important to America's expanding agricultural production because of the need for efficiency and conservation.⁴³ Focus on biomass fuel feasibility has been heavily tied to governmental involvement in research and development and tax incentives.⁴⁴ The agricultural industry needs support within the law for biomass fuel expansion.

III. BIOMASS ENERGY POLICY AND SUPPORTING LAWS

A. Biomass Fuel Production

The first major piece of legislation related to agricultural fuel production is the Biomass Act.⁴⁵ The questions that need to be asked are whether this fuel resource is a feasible energy source and whether society is committed to the commercialization of biomass fuels. Research and development assistance and tax incentives are the driving forces of the biomass industry, but environmental issues are becoming increasingly important.⁴⁶

1. Feasibility

The question still remains whether biomass fuels will be developed and used on a significant scale. The technology has proven feasible, and alcohol fuel production is increasing, as is Gasohol consumption.⁴⁷ Research and development has reached the point where the technical feasibility of producing biomass fuels is no longer questioned. An area needing further study, however, is the feasibility of large scale production facilities. The scientific community believes that even more efficient, higher octane biomass fuels are capable of being produced. A prerequisite to expanded biomass energy production is research on energy crops.

Farms could be energy self-sufficient by producing their own on-farm fuel. Small-scale alcohol production facilities are already available for the

43. See generally OFFICE OF TECHNOLOGY ASSESSMENT, ENERGY USE AND THE U.S. ECONOMY (1990) (assessing the trend of decreasing energy use per dollar of gross domestic product between 1972 and 1985).

44. See generally, Donald F. Santa, Jr. & Patricia J. Beneke, *Federal Natural Gas Policy and the Energy Policy Act of 1992*, 14 ENERGY L.J. 1 (1993).

45. 42 U.S.C. §§ 8801-8871 (1994).

46. Julie L. Williams, *Gasohol and Alcohol Fuels: Federal and State Regulations and Programs*, in 3 ENERGY LAW SERVICE § 7C.03 (Harold P. Green ed., 1980).

47. See 3 ENERGY LAW SERVICE § 7C.01 (Harold P. Green ed., 1980) (describing gasohol as a "motor fuel consisting of unleaded gasoline blended with alcohol (anhydrous ethanol) in a ratio of nine parts gasoline to one part alcohol" and also crediting the State of Nebraska with the trademark to Gasohol); GENERAL ACCOUNTING OFFICE, PERSPECTIVE ON POTENTIAL AGRICULTURAL & BUDGETARY IMPACTS FROM AN INCREASED USE OF ETHANOL FUELS 5-6 (1990).

individual farm.⁴⁸ Small alcohol plants, however, have not been built in great numbers due to continued low gasoline prices. Energy production on every farm is not efficient nor economical, but may at some point be practical for cooperatives or large farms, particularly those in which biomass is a natural by-product of existing crop or livestock operations.

The facilities producing ethanol today are limited to a few major producers and many smaller plants.⁴⁹ The ten largest producers generate a combined 87% of the ethanol produced each year in this country.⁵⁰ The development efforts of the national government have brought the biomass industry to maturity and biomass is now on the edge of prominence.

2. *Commitment by the Federal Government*

Agriculture's relationship with energy is provided as an introduction to agriculture's complete role in a national energy strategy. The federal government's commitment is directed at providing a significant amount of financial backing and research support as shown below.

a. *Research and Development.* Congress's commitment to research and development of biomass energy has been realized during the 1980s and 1990s, although with mixed results.⁵¹ The Congress allocates responsibility for implementing loan guarantee programs within different departments and agencies of the federal government. Congress furthered research and development through these loan guarantees and the facilities that established the biomass industry's production capacity.⁵²

48. See SOLAR ENERGY RESEARCH INSTITUTE, FUEL FROM FARMS: A GUIDE TO SMALL SCALE PRODUCTION C-3 (Feb. 1980) (providing a step-by-step guide to starting an on-farm production facility).

49. OFFICE OF ALCOHOL FUELS, DEP'T OF ENERGY, ELEVENTH ANNUAL REPORT ON THE USE OF ALCOHOL IN FUELS 2 (1990).

50. *Id.*

51. See Letter from Marc Humphries to Senator Tom Harkin (April 26, 1991), which lists actual appropriations for Department of Energy's Biofuels and Biochemical Programs:

Fiscal Year	Biofuels (dollars in millions)	Biochemical (subcategory)
1991 (est)	33.1	10.7
1990	17.3	4.0
1989	13.8	2.1
1988	16.9	3.3
1987	24.0	6.9
1986	27.0	6.9
1985	30.0	4.5
1984	28.3	-
1983	20.9	-
1982	20.5	-

(from 2 DEP'T OF ENERGY CONGRESSIONAL BUDGET REQUEST (1982-91)).

52. Federal support for ethanol fuel production began with the Food and Agriculture Act of 1977. Food & Agricultural Act of 1977, Pub. L. No. 95-113, 91 Stat. 913. Four biomass energy plants were authorized through Commodity Credit Corporation loan guarantees which

The problems with the early production facilities were related to the economic problems in the biomass industry. The cost of producing ethanol was approximately \$3.60 per gallon wholesale in 1980. The research and development projects were successful through these early experiments, to the point where ethanol cost approximately \$1.35 per gallon wholesale in 1991, according to the Solar Energy Research Institute, with a program goal of reaching \$.60 per gallon wholesale by the year 2000.⁵³ The decreasing costs are related to modernization of technology and operational efficiency.

The federal government has produced an optimistic climate for the success of alternative fuels.⁵⁴ The advances in biomass and other alternative sources have reached new levels. The precise directions for the future are yet to be resolved, but the federal government is making biomass cost competitive as an energy resource.

b. *Subsidy Through Tax Credits.* The use of an ethanol blend in gasoline is a central issue within the agricultural energy debate. The use of an ethanol blend has reached about an 8% share of the United States transportation fuel consumption.⁵⁵ Since 1978, government policy has supported ethanol production through tax incentives given on the sale of ethanol blended gasoline.⁵⁶

The goal of government policy has been to lead the biomass energy industry forward by means of tax incentives to make the production of biomass energy competitive with gasoline. This incentive comes through a reduction in the federal excise tax collected by the federal government on the sale of ethanol by the biomass blender or refiner.⁵⁷

would have been administered by Farmer's Home Administration, but no plants were built under this legislation. The four plants to be built were specifically identified in the legislation. See 7 U.S.C. § 2669(b) (1994); see also 1 JULIAN CONRAD JUERGENSMAYER & JAMES BRYCE WADLEY, *AGRICULTURAL LAW* §§ 2.4-.5 (1982).

53. *FY 1992 Authorization for the D.O.E.'s Renewable Energy Program: Hearings Before the Subcomm. on Environment of the House Comm. on Science, Space, and Technology*, 102d Cong., 1st Sess. (1990) (unpublished statement of Assistant Secretary for Conservation and Renewable Energy, Dep't of Energy).

54. The Food Security Act of 1985 authorized the Secretary of Agriculture to provide Commodity Credit Corporation certificates free or at a reduced cost to ethanol producers. See Food Security Act of 1985, Pub. L. No. 99-198, 99 Stat. 1354 (codified at 7 U.S.C. § 1281 as amended). In 1986, nearly \$56 million in commodity certificates was issued under authority granted to the Commodity Credit Corporation. See U.S. DEP'T OF AGRIC., *FUEL ETHANOL COST-EFFECTIVENESS STUDY 16-18* (1987) (citing AGRIC. ECONOMIC REPORT, U.S. DEP'T OF AGRIC., *FUEL ETHANOL AND AGRICULTURE: AN ECONOMIC ASSESSMENT*, REP. 562 (1986)).

55. General Accounting Office, *Perspective on Potential Agricultural & Budgetary Impact from an Increased Use of Ethanol Fuels: Hearing Before the House Comm. on Ways and Means*, 101st Cong. 5 (1990) (statement to the record of Judy England-Joseph, Associate Director, Energy Issues Resources, Community, and Economic Development Division).

56. CONG. RESEARCH SERV., U.S. CONG., *ALCOHOL FUELS 12* (1991) (The Energy Tax Act of 1978, containing a \$.04 per gallon excise tax exemption, was extended by the Windfall Profit tax of 1980. The excise tax was increased in 1982 to \$.05 per gallon and in 1985 to \$.06 per gallon. In 1987, Congress then raised the excise tax exemption to \$.06 per gallon and extended the expiration date to Sept. 30, 1993).

57. *Id.*

Economic studies show that biomass fuel refiners rely on tax credits for profitability.⁵⁸ Most economists agree that the resulting revenue losses to the federal government are offset by decreased farm subsidies.⁵⁹ Higher corn prices, in theory, result from the increased commodity demand. This, in turn, lowers farm program payments to farmers, in particular, deficiency payments, which are typically calculated using, in part, the difference between the target price and a lower recent market price.⁶⁰

Federal tax credits⁶¹ associated with the production of alcohol or ethanol are designed to make the product's price competitive with gasoline. The idea is to indirectly help the ethanol refiner obtain a market for the fuel. The Internal Revenue Code allows a buyer of gasoline who also buys ethanol or alcohol to blend it with the gasoline.⁶²

58. ECONOMIC RESEARCH SERV., U.S.D.A., ETHANOL: ECONOMIC AND POLICY TRADEOFFS 18 (1988).

59. *Id.* at 33-41.

60. When the market price drops below the Commodity Credit Corporation price support loan level, the latter price is subtracted from the target price; *see also Certain Tax and Trade Alcohol Fuel Initiatives: Hearings Before House Comm. on Ways and Means*, 101st Cong., 2d Sess. 295 (1990) (statement of United States Senator Bob Dole: "According to industry estimates, tax credits caused a saving of \$600 million in federal farm program costs.").

61. The tax credit is easily misunderstood as is evidenced by an exchange between Senator Bumpers and an energy department official at a Congressional hearing in 1990. Senator Bumpers asked the amount of the tax credit, and the answer given by the official was \$1.60 per gallon with the credit. *Implications of the Middle Eastern Crisis for Near-Term and Mid-Term Oil Supply: Hearing Before the Senate Comm. on Energy and Natural Resources*, 101st Cong., 2d Sess. 62 (1990). Senator Bumpers' response asked whether the cost of ethanol was \$2.20 or \$1.00 per gallon with the \$.60 per gallon credit. *Id.* The official was unable to explain and had to obtain and send the information to Congress for the record. *Id.* The answer provided was that the October 18, 1990, wholesale price paid for ethanol in Iowa was \$1.60 per gallon, but with a federal tax credit of \$.60 per gallon when the ethanol is blended with gasoline. *Id.* The wholesaler, therefore, receives \$.60 more per gallon than without the credit, or in other terms, the effective price paid by the blender is \$1.00 per gallon for the ethanol. *Id.*

62. I.R.C. § 40 (1988); 26 C.F.R. § 1.40-1 (1990); 26 C.F.R. § 48.4081-2 (1990); *see* 26 C.F.R. § 48.4041 (1990) (discussing the inclusion of ETBE under the excise tax exemption and a credit against the gasoline excise tax to the extent of \$.60 per gallon of ethanol when blended with the gasoline); *see also* Proposed Gasohol Rules, 56 Fed. Reg. 7627-29 (1991) (citing current regulatory proposals with comment period ending April 26, 1991). This blending credit offsets a portion of excise tax assessed on the sale of gasoline for road tax purposes. This tax credit is generally called the "blenders credit" and puts the blender in an economic position to pay \$1.60 for ethanol and recover \$.60 as a tax credit. Whereas, it is technically possible for the refiner to take an excise tax exemption at the pumps, this is not the case in today's market. The logic for not taking the excise tax exemption at the pumps rests upon the significant tax effects. Whereas, the credit is a dollar for dollar tax savings, an exemption would be a reduction in the price at the pump, but the income for the sale by the blender would be higher, resulting in higher income taxation by the blender, which is why all manufacturers use the blenders credit.

The tax credit for ethanol was extended until the year 2000 in the Budget Bill of 1990.⁶³ The authorization granted by the 101st Congress reduces the tax exemption for ethanol blend to 5.4 cents per gallon.⁶⁴ This tax incentive, however, will still help the ethanol industry's continued development.⁶⁵

B. Environmental Concerns

The environmental benefits of the use of energy produced from biomass are receiving increased attention.⁶⁶ Throughout the decade of the 1980s, government support of biomass was driven by its value as a fuel substitute. Today, biomass fuel is viewed as something more than a petroleum fuel substitute because of its environmental value. With biomass fuel gaining a favorable share of the energy market, it is seen as one way of cleaning up the environment.⁶⁷ Ethanol's greatest contributions are as a fuel octane enhancer and as a way to control air pollution by reducing carbon monoxide.⁶⁸

1. Biomass and Clean Air

Environmental considerations have entered the national policy picture during the past twenty years.⁶⁹ Today, environmentalists seek to influence energy policy. Not surprisingly, environmentalists are strongly supporting the use of a cleaner fuel supply.

In the Clean Air Act Amendments of 1990, Congress required that the worst polluting cities must meet new air quality standards determined by the

63. Omnibus Budget Reconciliation Act of 1990, Pub. L. No. 101-508 § 11211, pt. II, 104 Stat. 1388, 1388-423 to 1388-427 (1990) (codified as amended in scattered sections of 16 & 26 U.S.C.).

64. *Id.*

65. Twenty-eight states have reduced motor fuel tax rates for gasohol. See OFFICE OF ALCOHOL FUELS, DEP'T OF ENERGY, ELEVENTH ANNUAL REPORT ON THE USE OF ALCOHOL IN FUELS 16-17 (1990). These tax breaks are designed to encourage use of intrastate feedstocks, promote gasohol, and provide a cleaner burning transportation fuel. The overall effort of the states and of the federal government has been to intervene at the basic level of encouraging the production and marketing of biomass fuels. This added support has been helpful as a means of introducing a new fuel to consumers on the one hand, and assisting the biomass industry on the other. The biomass industry needs protection so that it can adjust facilities, grow in experience, and test the markets. *Id.*

66. See NATIONAL ADVISORY PANEL ON COST-EFFECTIVENESS OF FUEL ETHANOL PRODUCTION, FUEL ETHANOL COST-EFFECTIVENESS STUDY 4-1 (1987).

67. See Farm Disaster Assistance Act of 1987, Pub. L. No. 100-45, 101 Stat. 318 (1987) (codified as amended in scattered sections of 7, 16, & 33 U.S.C.) (directing the Secretary of Agriculture to conduct a study of the cost-effectiveness of ethanol production).

68. See DEP'T OF ENERGY, UNDERSTANDING THE CHALLENGES AND FUTURE OF FUEL ALCOHOL IN THE UNITED STATES I (1988).

69. See ROBERT S. GILMOUR, THE NATIONAL ENERGY PROBLEM 191-92 (1974) (discussing environment and energy relationship as interrelated problems).

Environmental Protection Agency.⁷⁰ In the implementation process, the designated cities can be involved with clean-fuel vehicle programs in order to help meet the clean air standards.⁷¹ From an economic standpoint, the effect of imposing civil penalties for violations of the Act⁷² should encourage the use of ethanol powered vehicles or sales of biomass fuel for use in vehicles with conventional internal combustion engines. The Clean Air Act and the technical provisions therein are such that a detailed analysis of the rules and procedures would be necessary for an accurate understanding. The ultimate effect is that several metropolitan areas require either ethanol use or plan alternative fuel requirements in the future.⁷³

One provision to note in the Clean Air Act is the requirement that a study be performed to review incentives for renewable energy. The Federal Energy Regulatory Commission and the Environmental Protection Agency are to "complete a study which calculates the net environmental benefits of renewable energy, compared to nonrenewable energy, and assign numerical values to them."⁷⁴ The study will look at the full range of environmental impacts including air, water, land use, water use, human health, and waste disposal.⁷⁵ The conclusions of the study "shall provide one or more models for incorporating the net environmental benefits into the regulatory treatment of renewable energy in order to provide economic compensation for those benefits."⁷⁶

Environmental economic principles strive to reach the point where the cost of producing the product would not make one person better off and one person worse off.⁷⁷ The idea is to obtain the best of both worlds—on one hand, complete freedom to do as one pleases, and on the other hand protection of the rights of nonpolluters. This is achieved by applying the notion of externalities and assigning a cost to air pollution, as well as other external, nonmonetary factors.⁷⁸ These externalities generate costs which are not normally added to the cost of production. The conclusion is that the costs of biomass fuel are less than gasoline, if you add the costs created by dirty fuels. Federal laws encouraging alternative fuel use implement a policy which promotes cleaner air and better environment.⁷⁹

With the environment becoming a prominent issue in society, our government has responded with legislation that will guide communities in meeting a higher level of clean air.⁸⁰ Environmental protection is a vital con-

70. Clean Air Act, 42 U.S.C. § 7410 (1994) [hereinafter Clean Air Act].

71. *Id.* § 7511a(c)(4)(A).

72. *Id.* § 7524.

73. See CONG. RESEARCH SERV., U.S. CONG., ALCOHOL FUELS 9, 14 (1991).

74. Clean Air Act, *supra* note 70, § 808.

75. *Id.*

76. See *id.* § 901 (giving information about research projects examination of the air pollution effects of all phases of processing alternative fuels).

77. See JOSEPH J. SENECA & MICHAEL K. TAUSSIG, ENVIRONMENTAL ECONOMICS 26-27 (1984).

78. *Id.*

79. *Id.*

80. See Clean Air Act, *supra* note 70.

cern for the future of the biomass industry and all efforts to factor environmental issues into the decision-making process will be important.⁸¹ With these environmental ideas in mind, other issues relating to biomass energy are now briefly reviewed.

2. *Current Federal Actions and the Courts*

The developments within energy law are distinctly rooted in public policy. A recent decision placed a biomass energy issue into the judicial arena.⁸² The argument against biomass fuels is led by oil interests and surfaced after several years of rulemaking by the Environmental Protection Agency.

*American Petroleum Institute v. EPA*⁸³ challenged the EPA rule requiring that 30% of the oxygen in reformulated gasoline (RFG) be derived from renewable sources.⁸⁴ Because the present primary fuel source meeting this demand is corn-based ethanol, the rule, in effect, encouraged the use of biomass energy. The interested oil associations fighting this rule, however, contended that the EPA did not have statutory authority for this action.⁸⁵

The final renewable oxygenated rule (ROR) for RFG issued by the EPA determined that:

[T]he ROR 1) will help conserve fossil energy resources and minimize any detrimental effects the RFG program may have on energy consumption; 2) has the potential to provide global warming benefits by stimulating the market for renewable oxygenates; and 3) will maintain the benefits of the RFG program and increase those benefits through incentives for increased ETBE use in the summer, displacing ethanol use during those months.⁸⁶

81. See ENERGY STRATEGIES: TOWARD A SOLAR FUTURE 165-69 (Henry W. Kendall & Steven J. Nadis eds., 1980) (discussing biomass as an attractive source of energy). Biomass fuels will help achieve fuel self-sufficiency for the nation and increase commodity sales for farmers. Commodity issues are important for market reasons, but biomass policy will be more concerned with food used as fuel and land preservation. See Congressman Thomas A. Daschle, *Congressional Action on Ethanol: Fulfilling the Need for a Renewable Domestic Motor Fuel*, 25 S.D. L. REV. 297, 300-05 (1980); OFFICE OF TECHNOLOGY ASSESSMENT, U.S. CONG., CHANGING BY DEGREES: STEPS TO REDUCE GREENHOUSE GASES 89 (1991) (diagramming the methods of using biomass energy and the feedstocks which are wood and wood wastes, agricultural crops, crop residues, municipal solid wastes, sewage sludge, animal wastes, and aquatic plants). This article will not present a detailed account of the various technological developments in the biomass industry. The basic concepts and products are methanol, ethanol, tertiary butyl ether (MTBE), and ethyl tertiary butyl ether (ETBE). The latter two are converted from methanol and ethanol respectively and are used as octane enhancers in gasoline. See generally Charolette Schwab, *Energy from Vegetation: Legal Issues in Biomass Energy Conversion*, 1 SOLAR L. REP. 785 (1980) (providing a complete study of the various biomass feedstocks and the issues related to the conversion process).

82. See *American Petroleum Inst. v. EPA*, 52 F.3d 1113 (D.C. Cir. 1995).

83. *American Petroleum Inst. v. EPA*, 52 F.3d 1113 (D.C. Cir. 1995).

84. *Id.* at 1116.

85. *Id.*

86. *Id.*

Whereas, this determination supports the pollution control aspects surrounding biomass fuels, various other forces are suppressing continued industry growth.

Because the goal of the Clean Air Act is air quality, pollution impacts should be determinative. Nevertheless, the EPA cannot be permitted to exceed its authority. It must be pointed out that methyl tertiary butyl ether (MTBE) is produced from natural gas and will be the main completion with ethyl tertiary butyl ether (ETBE) produced from corn.⁸⁷ Central within this conflict is evidence that "the use of ethanol might possibly make air quality worse."⁸⁸

The dynamics in federal developments is supported by the background presented in this presentation. Furthermore, the RFG rule was premised in the fact that the gasoline industry was a vast national network of industries which influenced gasoline end-products in very individual ways.⁸⁹

Further actions in this area will be the EPA counter attack by (1) pursuing further legal action, (2) lifting the "oxygen cap," which limits the use of renewable fuels, and (3) providing a labeling model system at fuel pumps for consumer education.⁹⁰ These actions are seeking greater usage of biomass fuels with extensive support within the agricultural lobby.⁹¹ The outcome of this important legal battle may be years in the making. Another way of strengthening the resolve for greater biomass use would be direct action by Congress. Congressional action does present itself as the best solution, if Congress would be willing to further mandate in this area. Nevertheless, a commitment within the EPA accepting biomass fuels is most encouraging.

IV. CONCLUSION

In presenting a thesis that biomass energy shall be useful in pollution control, this author contends that energy law is emerging under new terms and relationships which should include the agricultural sector and agricultural by-products. The direction in modern trends supports greater focus and respect for new forces in the energy marketplace.

Because they are a renewable natural product, biomass fuels do have environmental advantages. Moreover, transforming biomass into pure fuels does not prevent later supplying the same biomass product into food, fiber, and feed. Biomass energy deserves serious attention within the energy policy and law framework.

87. *Id.*

88. *Id.* at 1119 (citing 59 Fed. Reg. at 39,283).

89. *Id.* at 1118.

90. Letter from Carol M. Browner to Honorable Tom Daschle, Democratic Leader, U.S. Senate (June 2, 1995) (discussing the EPA's administrative commitment for renewable fuels).

91. *Id.*