

V. CURRENT FEDERAL PROGRAMS AND POLICIES

INTRODUCTION

The responsibility for gasohol development is spread among a number of federal agencies having different duties as well as contrasting, and in some instances conflicting, perspectives on gasohol. No clearly focused or operational federal policy on gasohol development has appeared to exist. The thrust of the federal government's efforts has typically been to respond to Congressional initiatives.

In FY 1979, OTA estimates that federal expenditures of between \$13 and \$17 million directly supported the development of alcohol fuels from biomass. In FY 1980 the Administration's research activities are expected to be funded at a level between \$18 and \$25 million. Additional subsidies include \$40 million in loan guarantees, exemption of the federal excise tax on gasohol (for domestic production and imports), eligibility of alcohol fuels for entitlement awards, and an investment tax credit of 20% on alcohol fuels facilities. Well over 90% of the federal government's cumulative expenditures (since 1975) have accrued in the last year.

The Department of Energy is the lead agency responsible for formulating energy policy and for the development of alcohol fuels technology. DOE'S responsibilities overlap the Department of Agriculture's responsibility to administer food and fiber production programs, and although a number of other agencies are involved (including the Departments of Commerce and Treasury), DOE and USDA are the principal agencies with jurisdiction over alcohol fuels development.

USDA POLICY

The USDA has been involved in agriculture policy since the Federal Farm Board was established in 1929. The Department has typically relied on carrot-and-stick combinations of supply control and price support programs to insure market stability, income protection to producers, and food security. These programs, together with extensive research and development programs (USDA FY 1980 solar energy R&D expenditures total more than \$27 million), place USDA in a unique position to develop biomass.

USDA policy towards gasohol development has historically lacked clear or consistent direction. Many agencies and programs within the Department have sometimes advocated conflicting or contradictory positions on gasohol. The Department has characteristically been in the situation of reacting to gasohol initiatives proposed by the Congress rather than developing or implementing their own.

The current thrust of USDA gasohol policy is to take a wait-and-see approach towards new or more energetic gasohol initiatives, other than those already proposed and enacted by the Congress. The Agency has emphasized R&D rather than implementation on the premise of resolving technical and policy uncertainties before implementing broad-scale programs having many unknown impacts. It is the view of USDA that Congress has already provided the agency with sufficient authority, particularly in the 1977 and 1978 Agricultural Acts, to support alcohol fuels production. USDA does not advocate further expansion of programs or policies until it is clear that additional initiatives are warranted.(23)

USDA'S current stance toward alcohol fuels is that agricultural policies and programs, and an alcohol fuels industry, can be mutually supportive only in various incidental or accidental ways. USDA further explains that (a) agriculture price support and stabilization policies serve different functions than any alcohol fuels program, and therefore no substitution and shifting of outlays is sensible; (b) due to extreme uncertainty in cropland availability, any commitment to a grain-based ethanol program should be restricted, in order to retain the options of foregoing further commitment, or of withdrawing completely, to minimize unrecoverable costs.

USDA R&D

No agency in the federal government has more abundant resources or greater administrative capability to research and implement biomass and alcohol fuels than does the USDA. Alcohol fuels development is so intertwined with food policies and the agricultural sector that in many cases USDA'S role in its development is essential. Biomass energy R&D, however, has a low overall priority in USDA'S research, in part because the Agency has no real energy mandate. The agency has a tendency to avoid burdening its (declining) research budget by funding work relating solely to energy.

Although alcohol fuels R&D has been emphasized over implementation-oriented activities, alcohol fuels have received relatively little attention. In FY 1978, of the \$6 million biomass budget, little supported alcohol fuels development directly. In FY 1979, about \$1 million

supported alcohol R&D (out of a total biomass budget of \$9 million). In FY 1980, it is expected that somewhere between \$4 million and \$6 million will be divided approximately equally between alcohol feedstock production and advanced conversion systems (of a total biomass budget of almost \$24 million). (The ranges in the budgets reflect the department's uncertainty in determining expenditures.)

Biomass and alcohol fuels R&D in the Department of Agriculture have, with some exceptions, suffered from a lack of direction and poor coordination. For example, USDA has made it a goal to aid the agriculture sector in becoming net-energy self-sufficient by 1990(41). The Agency has not, however, developed any plans, nor is it following any specific research strategies, to develop alcohol fuels or any other energy applications in the agriculture sector. Although this is due in part to the low emphasis given to alcohol fuels, it is also a reflection of USDA'S highly decentralized management with historically well defined areas of responsibility. A great deal of management responsibility for research resides in field offices and land-grant institutions, and it can be difficult to direct R&D policy under these circumstances. Newly established biomass/alcohol fuels programs in Fy 1980 may alleviate these sorts of difficulties, but they will not change fundamental management problems.

DOE POLICY

The Department of Energy is the lead agency responsible for developing alcohol fuels technologies. In the past, DOE has focused its efforts in the area of R&D; little emphasis was given to commercialization. Recently,

however, DOE has taken a somewhat more active role in supporting the technology's near-term development. Its role has been more aggressive than that of USDA.

DOE'S current policy is designed to achieve low to moderate levels of ethanol production in the near term. The Agency is relying predominantly on two federal incentives: (1) exemption of the federal excise tax on gasohol blends, worth \$16.80/barrel, and (2) entitlement awards to alcohol fuels worth 2 to 3 cents/gallon, or roughly \$1.00/barrel. With these subsidies DOE projects that ethanol production can reach 500 to 600 million gallons annually by 1985 using wastes (e.g., cheese whey) rather than agricultural commodities. The Agency at this time does not support any significant expansion of programs or subsidies to further stimulate the production of gasohol. (It should be noted that the Administration has recently proposed several synthetic fuels initiatives that are projected to achieve ethanol production levels of over 1 billion gallons annually. It is unclear at this time, however, whether these levels can actually be reached with the initiatives proposed.)

DOE R&D

DOE has responsibility for molding the federal government's alcohol fuels research effort. In FY 1978, DOE expenditures for alcohol from biomass R&D totaled almost \$5.5 million. In FY 1979 and FY 1980, OTA estimates that alcohol related expenditures will total \$12 to \$14 million and \$14 to \$17 million respectively. During these years, 50% to 65% of program funds supported conversion R&D, 25% to 35% supported end-use

studies, and 15% to 25% went towards production and collection research.

Overall, DOE'S technology development efforts on conversion technologies have been balanced and supportive of a range of promising low-to high-risk technical options. The same is true to some extent in the area of biomass production and collection. OTA has found that DOE biomass programs have supported a narrow range of long-term technological applications, but this has not been the case in the specific area of alcohol fuels development. Whereas OTA has determined that many DOE biomass programs have been fragmented and administered ineffectively, management problems do not appear to have substantially affected the Agency's alcohol fuels development efforts.

INTERRELATIONSHIP BETWEEN DOE AND USDA

The Department of Energy is designated as the lead agency in bioenergy R&D and as such has responsibility to integrate and coordinate alcohol fuels technology development. At the same time, USDA is responsible for administering agricultural production policies, as well as R&D. Since alcohol production and use is intertwined with the farm and energy sectors, the success of an alcohol fuels development program is in part contingent upon the implementation of complimentary production, conversion, and end-use policies and research programs by the two agencies.

The agencies, however, have made few efforts to integrate agriculture and energy policies. A comprehensive framework has not been established to perform this role adequately, and inter-agency coordination has been poor. In the area of research, the coordination of DOE and USDA biomass programs has been improving. Inter-agency coordination of alcohol fuels programs has not, however. If coordination is to improve, administrative and technical differences between these two very different agencies must be resolved.

RESEARCH AND DEVELOPMENT NEEDS

OTA has identified major areas where research and development seem particularly important. The purpose of this section is to describe these research needs and to indicate to what degree the federal research effort is currently addressing them. It should be understood that not all possible research areas should necessarily be addressed by the federal government.

Feedstocks

Develop feedstock crops with higher yields of ethanol per acre. Comparative studies of starch and sugar crops, and high-yield hybrids, which are candidate feedstocks. Regional studies should examine productivity as a function of soil type, weather, etc. (The federal government directly and indirectly, has supported a great deal of research in this area. The research, however, has focused on food and feed production rather than on energy production, and research is needed to assimilate the existing data.)

Investigation of the effect of uncertainty and variability of prices and supplies in the agriculture markets on the potential of producing energy from agriculture. (The Federal government has supported a very limited and narrow range of investigations in this area.)

Develop ethanol feedstock crops which are nitrogen fixing, so as to reduce the energy inputs to farming. (USDA is supporting a significant amount of research in this area.)

Investigate the feed value of distillers grain, particularly at high levels in the feed and with large water content. (uSDA is supporting some research in this area.)

Develop nitrogen fixing bacteria which can be substituted for nitrogen fertilizer. (This is a basic research area which NSF has supported to some degree.)

Screening of unconventional plant types as candidate feedstocks. (The federal government has supported little research in this area.)

Regional studies to evaluate the availability of residues. Detailed evaluations need to be performed to determine how residue use can alleviate and/or exacerbate environmental problems such as soil erosion. Analyses of institutional constraints of residue use are also needed. (USDA has supported research in this area. Institutional

issues, however, have not been addressed.)

Environmental effects of increased forage grass production. (The federal government has sponsored little research in this area.)

Investigation of the environmental effects of pesticides, herbicides, fertilizers, soil erosion, and other effects associated with increased agricultural production. (USDA has supported a limited amount of research in this area, but little has been done regarding energy production.)

Analysis of the availability and productivity of potential crop lands, the costs of bringing this land into production, and its effect on agriculture markets. (Little research has been done in this area.)

Impacts of protein (e.g., distillers' dried grains) on conventional (and non-conventional) domestic and international markets. (Little research has been supported in this area.)

(There are many R&D problems associated with obtaining feedstocks from the forest sector which are not mentioned here but which could greatly influence feedstock availability.)

Conversion

Research into improving the yields of cellulose hydrolysis. (DOE and NSF are supporting research in this area.)

Basic thermochemical research into rapid pyrolysis, particularly to attain high ethylene yields. (The federal government has supported little research in this area.)

Application of solar-thermal systems to distillation. (The federal government is supporting little research in this area.)

Development of simple and less energy intensive methods for concentrating ethanol-water mixtures, e.g., phase separating salts, vacuum distillation, absorption processes, desiccants, freeze crystallization, membrane applications, and extraction. (The federal government is supporting research in these areas to a very limited degree.)

Develop low-cost methods to produce anhydrous ethanol in small-scale applications. (The federal government has supported little or no research in this area.)

Definition of the environmental effects of distilleries. (The federal government has sponsored a limited amount of research in this area. Little analysis, however, has been done on on-farm systems.)

Develop on-farm distilleries which are relatively automatic. (USDA and DOE are beginning some research in this area.)

Develop continuous fermentation processes. (DOE is sponsoring research in this area.)

Gasification of biomass as a source of hydrogen. (Present source of hydrogen -- used to produce fertilizer -- is natural gas.) (The federal government is sponsoring little research in this area.)

Examine energy and non-energy uses of liquid by-products. (A limited amount of research is funded by NSF.)

Research on the conversion of hemicellulose to liquids.
(DOE is sponsoring a limited amount of research in this area.)

End-Use

Determine the thermal efficiency of gasohol, in terms of best fuel blend. (DOE has recently begun work in this area.)

Develop emulsions and additives which can eliminate the need for using dry ethanol. (The federal government has supported little research in this area.)

R&D on the use of pure alcohols (and applicable lubricants) in the motor fleet. (DOE has work on-going in this area.)

Determine long-run effects on performance, efficiency, and materials compatibility associated with the use of gasohol. (DOE has funded a limited amount of work in this area.)

Study of the effect of net increased aldehyde concentrations on air pollution. (DOE has begun some research in this area.)

Studies on the combustion chemistry of gasohol. (The federal government has supported research in this area.)

Examination of the potential for using gasohol in specific regions where its use may have unambiguously positive results. (The federal government has sponsored no research in this area.)

Research various gasoline compositions to determine ways of effectively using ethanol's octane boosting properties while minimizing evaporative emissions. (DOE has sponsored a limited amount of research in this area.)

Field test phase-stability of gasohol in distribution systems. (Little research has been done in this area.)

Evaluation of the long-run effects of using alcohol in diesels.
(Little research has been done in this area.)