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#### **iv . SOCIAL IMPACTS**

The widespread production and use of gasohol can be expected to have a number of social and economic effects. These include impacts that are more likely to be perceived as important at the local level (such as changes in employment, demography, public services, and quality of life) as well as impacts that can be national *or* international in scope (for example, changes in the economy, land ownership, institutions and politics and ethical considerations). Some of these impacts are quantifiable, while others can only be discussed qualitatively. It should be noted that the scope and magnitude of these effects are highly uncertain because no reliable methodology for predicting the social impacts of emerging technologies exists and because the size and location of projects are unknown. Consequently, this discussion will only be able to identify some of the potential social changes that could occur if gasohol were used widely.

#### LOCAL IMPACTS

Increased production and consumption of gasohol would create a variety of new jobs. Approximately 15-19 million additional hours of farm labor would be required to produce 1.3 billion gallons of ethanol per year from corn (0.1 quad/year). (37) (Comparable productivity estimates were not available for feedstocks other than corn.) Additional employment opportunities would arise in the transportation of feedstocks to distilleries and of ethanol to refineries or gasohol distributors, as well as in the manufacture and delivery of fertilizer, farm machinery, distillery equipment, and in the construction and operation of distilleries. Estimates of the number of distillery operating, maintenance, and supervisory personnel required to produce 1.3 billion gallons of ethanol per year from corn range from 1,200 to 4,000. (5, 20) Comparable figures were not

available for distillery construction or for the manufacture of distillery equipment.

The production of distillery fuels would also create employment opportunities on farms or in coal mines. The use of crop residues and/or cellulose crops to fire distillery boilers would require additional farm labor, but not on the same scale as would the production of corn for ethanol feedstocks. For example, harvesting corn residues requires 6-10 million work-hours per 1.3 billion gallons of ethanol for a large round bale system, or 3.5-4.5 million work-hours per 1.3 billion gallons of ethanol for a large stack system. (10) Labor requirements for harvesting collectible residues and moving them to the roadside are summarized in Table 5. Additional labor would be required to transport the residues to a distillery. Alternatively, if distilleries are fueled with coal, approximately 375,000-600,000 underground coal mine worker shifts or 125,000-200,000 surface mine worker shifts would be required to produce 1.3 billion gallons of ethanol. (38)

TABLE 5

## LABOR REQUIREMENTS FOR HARVESTING COLLECTIBLE RESIDUES

(million work-hours/1.3 billion gallons)

	Large Round Bales	Large Stacks
Corn	6.2-9.7	3.5-4.4
Small Grains	3.8-6.8	3.4-4.1
Sorghum	14.4-15.2	10.0-10.3
Rice	14.8	
Sugar Cane	11.2	

Source: Reference 10.

For the most part, the employment opportunities discussed above represent the creation of new jobs rather than the transfer of existing agricultural and energy sector employment to the production of gasohol. To the extent that current food and feed production is used for ethanol, however, new jobs are not created. In addition, use of corn stillage as animal feed would compete directly with soybean meal and may reduce employment in that industry. (10)

It should be noted that estimated labor requirements in agriculture are very uncertain. Crop production is highly mechanized and labor requirements have declined continuously since 1950. If farm labor productivity continues to increase, the estimates given above are high. Other uncertainties are introduced by the projected method of increasing production; more labor usually is required to expand the number of acres in production than to increase the output per acre, and some crops require more labor than others. In addition, during peak farm seasons such as planting and harvesting, agricultural labor often is scarce. Emphasizing crops that require less intensive management and that are harvested at different times of the year from conventional food and feed crops could alleviate this problem.

The impacts of new employment opportunities depend in part on where they arise and in part on whether they are filled by residents or in-migrants. The eastern half of the U.S. has the greatest amount of potential cropland. (31 Assuming that these lands are used to produce ethanol feedstocks, most of the employment opportunities associated with gasohol would arise in these regions. Productivity on some of the lands in

the North, however, ultimately is limited by water availability, climate, and other factors. Thus, increased production in the North probably will be greatest in the Corn Belt and Lake States.

On-farm employment and new jobs associated with distillery operation (except for jobs requiring special skills) probably would involve long-term rural residents. This could reduce off-farm migration, shift the age distribution in rural areas to a younger population, revitalize small farming communities, and increase the demand for migratory workers during harvest season. On the other hand, distillery construction is more likely to involve temporary in-migrants or commuters. Rural agricultural areas are not well equipped to accommodate in-migrants, and temporary shortages of housing, education and medical facilities, and other public and private sector goods and services could occur during construction. These impacts will be minor, however, in comparison to those associated with energy development in the West. Although a distillery would contribute significant amounts to the local tax base, tax revenues usually do not begin to accrue until a facility is in operation.

#### NATIONAL AND INTERNATIONAL IMPLICATIONS

In addition to increases in tax revenues, ethanol production could have significant economic impacts on the price of food and farmland. Should the demand for ethanol feedstocks increase more rapidly than the supply, the result would be increases in farm commodity prices and farm income. Many agricultural economists believe that this situation leads to increases in farmland prices that permanently increase the cost of farming. Although this would benefit the landowner, it also would threaten the viability of

farming on rented land by eliminating gains in farm income. In addition, it could endanger small farmers<sup>1</sup> ease of access into the market and accelerate the trend toward large corporate holdings of farmland.

Increases in the cost of farming and competition for ethanol feedstocks between energy and food markets could also increase the cost of food. This increased cost falls disproportionately on the poor. In addition, increases in U.S. food prices are likely to increase the cost of food on the international market. Some countries will not be able to afford food imports, and others will export crops now used domestically for food. In either case the net result would be to worsen the world food situation. It is not known, however, at what level of increase in land and food prices these effects will occur, and their final impact cannot be determined.

The institutional impacts of increased gasohol use include changes in governmental and social structures and in attitudes and public opinion as well as ethical considerations. Within the government, the principal changes would occur in federal and state agencies. The use of farm commodities and currently unproductive cropland to produce ethanol would require the Departments of Agriculture and Energy to cooperate on both energy and agricultural policy. Changes in existing tax policy also may be necessary to facilitate the production of ethanol for fuel, and to prevent the loss of tax revenues that normally would accrue from sales of gasoline and alcoholic beverages.

Changes in social institutions probably would evolve over longer periods of time. Increases in employment on farms and in rural agricultural

areas would decrease the number of young people leaving these areas and ultimately strengthen the rural family and farming as a way of life. On the other hand, significant population increases in rural areas with "one-crop" economies could result in impacts that would destroy long term residents' sense of community and rural quality of life.

Favorable individual and group attitudes and general public opinion are politically and practically necessary to large-scale production of ethanol. Favorable public opinion is politically necessary for the funding and implementation of government programs directed toward the supply of and demand for gasohol. Favorable attitudes among farmers toward the conversion of currently unproductive land to ethanol feedstock production are also necessary if these programs are to be effective. Although the use of agricultural lands for ethanol feedstocks is likely to be politically popular among most non-agricultural groups, the conversion of non-productive federal land (for example, Bureau of Land Management lands) to cropland probably would be opposed by some interest groups, such as conservationists.

In addition, favorable attitudes in the farm sector toward the production and use of ethanol fuels will be necessary to the success of small on-farm systems. Recent research on the adoption of innovations in agriculture suggests that the best predictors of the adoption of commercial (as opposed to environmental) innovations are above-average farm capital, size and sales, as well as the farmer's education. These findings were correlated with traditional agricultural extension service strategies for the voluntary adoption of innovations by farmers. (39) These strategies are based on the well-documented diffusion process of commercial practices, and

probably can be applied to the on-farm production and use of ethanol.

Finally, the increased use of gasohol can raise ethical considerations related to the conflict between food and feed, on the *one* hand, and energy on the other. This conflict has become increasingly prominent in the last decade as both food shortages and the finiteness of conventional energy resources have become recognized as world problems. In the U.S., this conflict historically has revolved around the use of prime agricultural land for surface and, to a lesser extent, underground coal mines, and around energy uses of water in the arid regions of the West.

Increased demand for farm commodities to be used for domestic fuel will highlight this conflict because fuel use will compete directly with U.S\* food and feed exports. If food exports are reduced significantly in order to augment U.S. energy supplies, adverse foreign responses could result. The use of farm commodities for ethanol also will compete directly with domestic consumption of food and feed, and limits on the sale of commodities for energy could become necessary. In addition, if ethanol feedstock suppliers are given long term guarantees in order to stimulate production of gasohol, and if the demand for food continues to rise, Americans ultimately could be forced to choose between relatively inexpensive food and relatively inexpensive fuel.

Of the social and economic impacts discussed above, those that are most likely to become problems include potential increases in farm commodity and farmland prices, and potential conflicts between the use of commodities for energy rather than food or feed. The timing and magnitude of increases in



the price of food and land cannot be determined, however, and their total effect is uncertain. The production and pricing of ethanol feedstocks could be integrated into overall U.S. agricultural and energy policy before these impacts become severe. Other long-term social and economic impacts of gasohol production and use -- revitalization of farm families and rural communities, as well as increased domestic energy self-sufficiency -- would be beneficial.