gasoline (or diesel), alcohol and water, and engines which run on pure alcohol have been developed although they are not commercially available in Canada.

The economic risk of farm-scale alcohol production is not well defined. Farmers may find this activity worthwhile if they are good handymen and can build a still rather than buy a commercial set-up. They may also not count their own labour in overall costs. In any event there will be some capital outlay and interest to be paid on the capital. In addition, the farmer must consider the loss in revenue from not selling that portion of a crop which is used as ethanol feedstock, plus the costs of depreciation, operation, energy inputs, chemicals, enzymes, insurance, licensing and bonding. (Feeding the mash or residue from ethanol production to livestock could help offset some of these expenses.)

CONCLUSION

Evidence suggests that on-farm alcohol production can be a risky business. Some knowledge of chemistry, engineering, microbiology and plumbing is required and careful economic planning must be carried out before any such operation is attempted.

One way in which Canada is attempting to make it easier for interested and enterprising individuals or groups to begin alcohol fuel production is to ease regulations set out in the Excise Act. Under existing legislation, alcohol must be collected in a "locked receiver" which can only be opened by a customs and excise inspector. The alcohol must also be rendered undrinkable (denatured) by adding a prescribed chemical if the alcohol produced is to be free of excise duty. Furthermore, a distiller's license ($250 per year) is required as well as a surety bond of $200,000 which costs $500 per year. These restrictions inhibit would-be distillers from making alcohol fuel.

CONCLUSION

The Committee welcomes the Government action to amend the Excise Act, making it easier for interested people to begin distilling alcohol fuel.

RECOMMENDATION

The Committee recommends that the Government ensure, in its amendments to the Excise Act, that production of ethanol in excess of individual requirements may be sold to retail suppliers of alcohol fuel or gasohol.

RECOMMENDATION

The Committee does not endorse pure ethanol from starch or sugar feedstocks as a major alternative liquid transportation fuel for Canada. It does, however, recommend that fuel ethanol be permitted for personal use or for the production of gasohol.

B. METHANOL

Methanol (CH_3OH) can be synthesized from a variety of sources including biomass, natural gas and coal. In the cases of biomass and coal, the raw feedstock must first be gasified before synthesis.

In the production of methanol from wood biomass, three basic steps are involved: gasification of the wood, cleanup and modification of the gas produced, and liquefaction of the gas. Generally, gasification occurs when the wood is heated in an atmosphere deficient in oxygen. This prevents complete combustion of the wood and produces a gas containing principally hydrogen, carbon monoxide, carbon dioxide and hydrocarbons. These gaseous compounds are not produced in concentrations ideal for the synthesis of methanol; therefore, their relative proportions are altered to obtain a hydrogen to carbon ratio which will provide good yields of methanol. In the final step, methanol is produced by subjecting the modified synthesis gas to from 50 to 150 atmospheres of pressure at 230 to 270°C in the presence of a catalyst. A flow diagram for methanol synthesis is given in Figure 6-5.

Initially, a methanol industry could be fueled by unusued mill wastes, forest residues, and other recoverable biomass not currently utilized. In the long-term, however, significant potential exists for tree farming (energy plantations) to provide the cellulose required to feed methanol plants. These plantations would allow abandoned farms and marginal lands to provide high yields of forest biomass with rotation times of from two to five years.

Since the quantities of cellulosic feedstocks are so much greater than those of sugar or starch crops, it would seem there is greater potential for alcohol production via the methanol route than via the ethanol route (although production of both alcohols can be encouraged). The provision of cellulosic feedstocks for methanol production requires less energy than does raising agricultural starch or sugar crops. In other words, the chances of achieving net energy gains from methanol may be greater than from ethanol. Fewer land-use arguments should arise in producing feedstock for a methanol industry than for an ethanol industry as trees can be grown on land which ranges widely in quality and topography. Indeed, there is unlikely to be