

Non-technical policy, regulatory, and market influences on the use of liquid biofuels: Summary of the findings of IEA Bioenergy Task 27

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Biofuels are important parts of the transportation fuel mix in many countries. Ethanol is the most widely used biofuel at present, and smaller amounts of ETBE (ethyl tertiary-butyl ester) and biodiesel are used in various locations. Biofuels are expected to become even more important for transportation in the future. These fuels reduce national dependence on petroleum and contribute to sustainable energy systems. Biofuels also burn cleanly and provide opportunities for local economic development and job creation. At present, the extent to which biofuels have entered the marketplace varies significantly by country. For example, the United States uses about 4×10^9 liters of ethanol annually in transportation fuels. By comparison, most European countries have been slower to accept biofuels. The reasons for these differences are complex and include a variety of policy and market issues.

Beginning in 1999, the IEA Bioenergy Task 27 started a project to examine the non-technical policy, regulatory, and market factors that influence the use of biofuels. The overall goal of this effort was to determine the primary reasons why biofuels have been implemented more successfully in some regions than in others. This paper summarizes the major findings of this work.

IEA Bioenergy Task 27

The International Energy Agency (IEA) provides a mechanism for participating countries to exchange information and conduct collaborative RD&D activities on energy-related topics. As part of this effort, the IEA Bioenergy Agreement was established about 20 years ago to deal with the area of bioenergy. IEA Bioenergy has established several Tasks dealing with high-priority aspects of biomass production, conversion and utilization. More information about IEA Bioenergy is available elsewhere¹.

In 1998, IEA Bioenergy initiated Task 27 to examine the regulatory, policy and market issues related to liquid biofuels. The Task had five participants including Austria, Canada, Sweden, United States, and European Union. Participants exchanged information and conducted analysis activities to provide governments, policy makers, and stakeholders with improved information on non-technical issues related to biofuels. This three-year effort was completed in early 2001.

As part of this effort, the Task examined the differences influencing current biofuels usage in Europe and North America. The analysis examined the current use of biofuels use in various countries and related biofuels usage to policy considerations such as tax policy in those countries. The Task also analyzed the issues involved in scenarios where biofuels use increased either moderately rapidly in those countries. These results are summarized below. The interests of other countries such as Brazil were not considered at this time due to funding and time constraints.

Comparison of Biofuels Implementation in Europe and North America

Blends of 5-10% ethanol in petroleum gasoline are used extensively in North America, and blends of 85% ethanol are also becoming available in selected cities for use in flexible-fuel vehicles. By comparison, ethanol is used much less extensively in Europe. France uses significant amounts of ETBE produced from ethanol, and several other countries including Sweden have increased ethanol usage through various demonstration projects. Biodiesel is of interest in both Europe and North America, but the quantities used for transportation fuels are currently small in both regions.

Primary Driving Forces: The primary driving forces causing the differences in biofuels usage between countries appear to be the national policies of those countries. Over the past few decades, market prices of biofuels, either ethanol or biodiesel, have been higher than the market price of petroleum-derived equivalents. It is therefore not surprising that biofuels have had significant impact only in those countries where policies or incentives have provided a means for biofuels to compete economically.

In both North American and Europe, taxation policies have been the primary driving force that has allowed biofuels to have market impact. High motor fuels taxes, by themselves, do not significantly increase biofuels use. North America with lower overall fuel taxes in fact uses greater percentages of biofuels than in Europe where fuels taxes are much higher. To be effective, tax and policy incentives must directly deal with biofuels. These two regions currently use different types of taxation mechanisms that will be discussed in more detail in this paper, and the different approaches have resulted in different levels of biofuels usage.

The differences in biofuels use between North America and Europe is also partially driven by the fact that ethanol is currently more expensive in Europe. The price of commercial grain-based ethanol in Europe is nearly double the cost in North America. This price differential is the result of several factors including the use different feedstocks, (corn or wheat), the economies of scale enjoyed by North American producers, differences in the respective markets for animal food from spent grain, and other factors.

Popular support is crucial for biofuels, but this support is insufficient for biofuels implementation unless it is accompanied by appropriate national policies. Agricultural groups have been particularly effective in creating interest in biofuels and promoting government policies. Consumer interest also assists with biofuels implementation, but consumers are generally willing to pay only a small incremental difference of \$0.02-0.03/litre for “green fuels”. Environmental groups have also generally been supportive of biofuels in the countries with successful programs.

Scenarios for Moderate and Rapid Growth of Biofuels: Task 27 also performed a qualitative analysis of the issues involved in expanding the use of biofuels either modestly or rapidly over the next few years. Modest growth was defined as increasing biofuels by approximately 5-10% from present levels or achieving reasonable market penetration in countries that currently do not use significant biofuels over the next five years. Rapid growth was defined as increasing biofuels use to 10% of the total motor fuels in a country within ten years.

In both North American and Europe, the modest growth scenario can be readily accommodated, and increased use of biofuels is expected even if present policies are unchanged. Rapid growth scenarios are also potentially feasible, but will require numerous changes from the present situation. These changes would include different government policies, changes from grain-based feedstocks to lignocellulosic ones, and significant capital investments.

Conclusion

Biofuels, particularly ethanol and biodiesel, are used extensively in motor fuels in North America and Europe. The initial market penetration has been facilitated by national policies that allow these fuels to be economically competitive. Modest growth of these fuels is likely to continue with present policies. More dramatic growth in the use of these fuels is also feasible, particularly if advanced technologies and government policies can be combined to assist with this development.

References

[1] IEA Bioenergy. Annual Report 2000. Forest Research Institute, Rotorua, New Zealand. 2001.