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## **FLEXI-FUELED VEHICLES AND INCENTIVES TO THE USE OF ETHANOL FUEL: THE CASE OF USA, BRAZIL AND SWEDEN**

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### **Overview**

Flexi-fueled vehicle (FFV) is an alternative fueled vehicle that can run using two types of fuels in any proportion. The two fuels can be filled in the same tank and the most widely developed FFV is the one that can run with gasoline or with ethanol or with any mix of both fuels. The successful introduction of FFV is a necessary condition to increase the participation of ethanol fuel in the pool of fuels used in a country. Taken for granted the option of a government to increase the demand for ethanol, this article aims to analyze three successful experiences in introducing this technology: USA, Brazil and in Sweden. The objective is to identify which elements have been responsible for this success, the role of government and the impacts of FFV on fuel demand. This article provides insights on the perspectives of this technology and ethanol demand on European countries that are implementing incentives to ethanol fuel demand.

### **Methods**

The article adopts an institutional approach of the three experiences focusing on three different aspects: a) economic context, which includes the structure of fuel demand and supply; b) government measures; c) private agents (companies and consumer organizations). The article is organized as follows: i) Description of the technology and historical development; ii) a comparison of the three experiences: economic context; government measures and private agents; iii) economic impacts of FFV; iv) Conclusions: which lessons can be taken from these experiences. In this last section it will be highlighted perspectives to the introduction of this technology in European countries, in particular in France is putting in place a plan to develop this market.

### **Results**

In terms of economic context, the three countries share some common features such as: i) previous experience - that is, in the three countries the impulse to ethanol use and development of ethanol technology dates back to 70's and has been launched by petroleum crisis.; ii) gasoline is the dominant fuel in passenger's cars (although in Brazil in terms of global consumption diesel is the most consumed fuel in transportation sector).

Regarding government intervention, it is expected to be a fundamental element in the three experiences, but it took different forms. It has been conditioned by economic context and it was not concentrated only on the automobile industry. Private agents linked to the automobile industry have been the most active group in Sweden, while in Brazil and US the role of agriculture producers has been fundamental.

The success of FFV's in increasing ethanol demand depends on the supply infrastructure, on the presence of mandatory acts (such as those implemented in US) and on relative prices, since it transforms gasoline and ethanol in perfect substitutes. On the other hand based on the Brazilian case, it is shown that the FFVs have also an impact on relative prices, however, ethanol prices seem to be still much more influenced by agricultural conjuncture. Relative prices are a key element to increase ethanol demand.

**Conclusions**

In the three experiences the introduction of FFV has been successful and there has been an increase in ethanol demand. However, the resulting increasing in demand is a result of a group of elements particular to the economic context, the interaction between the different interest groups and political measures. Perspectives to European countries that are planning to increase ethanol consumption, like France, are not so promising in which concerns FFV. Considering economic context and the manifested interest of private agents, the government in European countries will have a more decisive role in order to compensate the adverse context and to surpass the obstacle provided by relative prices.