



Fact Sheet 6:

Examples of ground transport biofuel mandates around the world

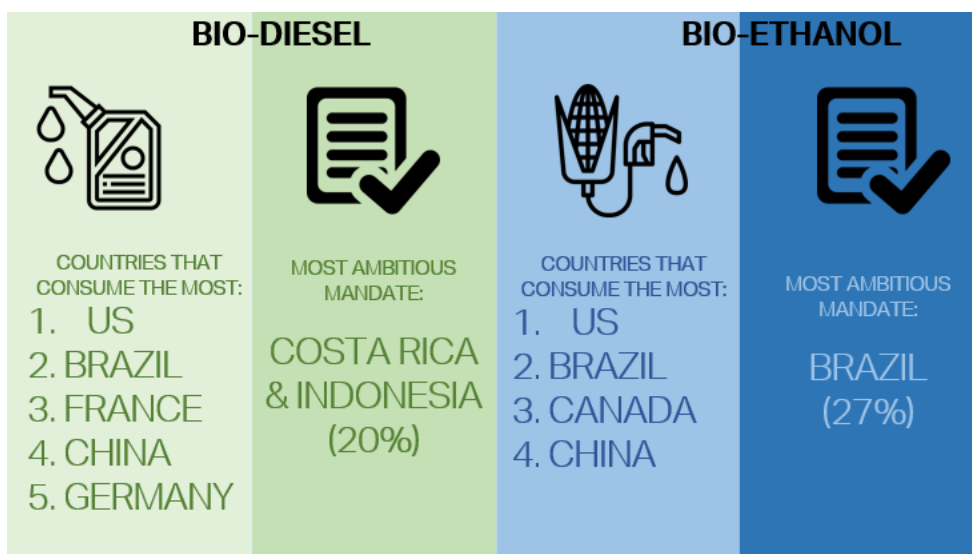
Introduction

The purpose of this information-sheet is to graphically represent some of the countries that have ground transport biofuel mandates, how aggressive these mandates are, and the total volume of biofuels consumed in each country. This information will help policymakers understand which countries are using or promoting the use of biofuel. This is relevant for the aviation industry as nations that have more experience or interest in biofuels for road transport or energy production, could be more likely to have a faster adaptation and implementation of sustainable aviation fuels. Adopting and implementing sustainable aviation fuel mandates exposes considerably greater challenges, especially concerning creating market distortions, which is discussed in a separate factsheet.

This paper demonstrates that most of the ground transport mandates and consumption of biofuels is concentrated into mainly two regions: South America and Europe, although the highest biofuel consumer in the world is still the United States of America.

Findings

The analysis below features the only two biofuels considered by mandates, bio-ethanol and bio-diesel, to demonstrate where the largest consumers and mandates are located.



Highlights:

Bio-diesel is clustered around Europe and Latin America, while bio-ethanol is distributed more evenly across the globe.

Bio-Ethanol

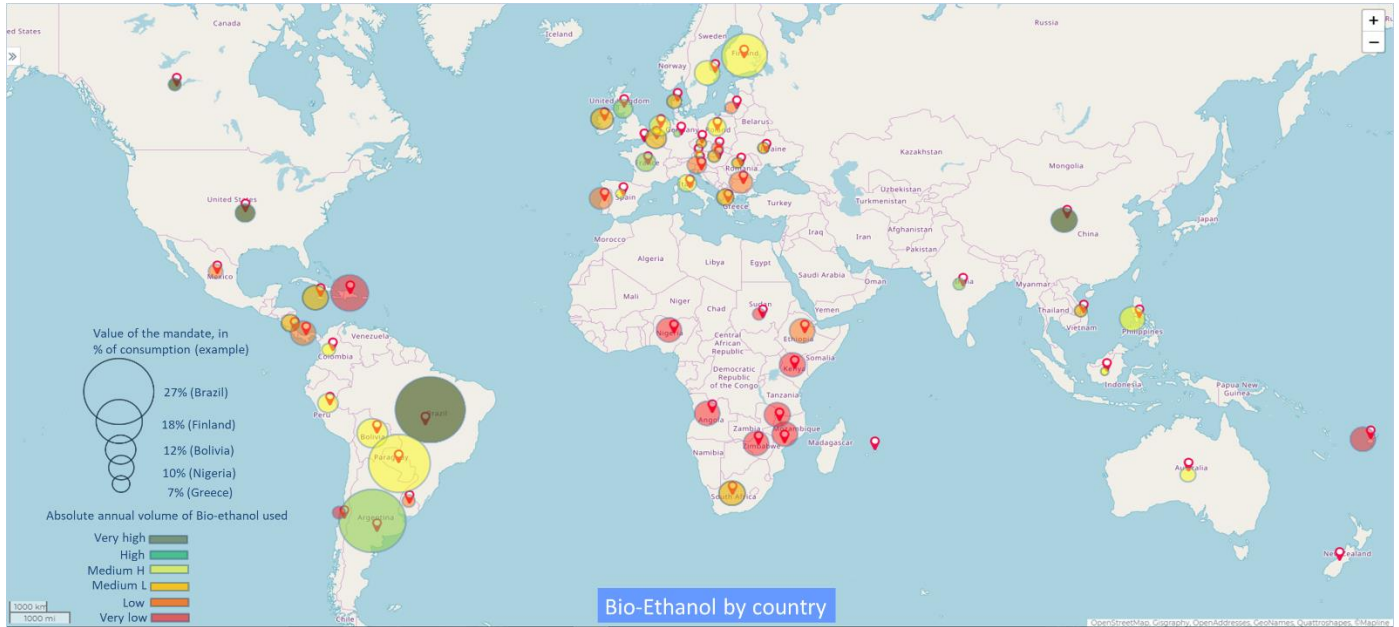


Figure 1 List of bio-ethanol mandates and consumption by country

Figures 1 and 2 are graphic representations of fuel mandates. Each pin on the map indicates a country where a mandate exists, again, there might be other countries which have mandates and are not on display. The circle's diameter represents the value of the mandate taking the highest mandate as the reference. In Fig.1 the country with the most ambitious bio-ethanol mandate is Brazil (27%) and so this is the largest circle. The key to the circle sizes shows examples of the mandate's strength along with an example of a country in which this mandate is applied. The colour of the circles indicate the absolute amount of biofuel consumed in that specific country. For example, Paraguay has a strong bio-ethanol mandate (24%) but the consumption is "medium": France consumes a lot more bio-ethanol than Paraguay in absolute terms, although it has a less ambitious mandate. The Dominican Republic, also has a strong mandate (Compared to many European countries), however, the absolute consumption is lower. The four countries that consume more bio-ethanol in the world, based on the source information, are The United States, Brazil, Canada and China. The United Kingdom, France, Germany, India and Argentina follow in their absolute consumption, and so on. The mandates for bio-ethanol are generally more aggressive in South America than in any other region, however, Europe has the most mandates and the average consumption is higher there and in North America than in other regions. Central Asia, and Northern and Central Africa are the regions with the least amount of mandates, as far as the original sources are concerned.

Bio-Diesel

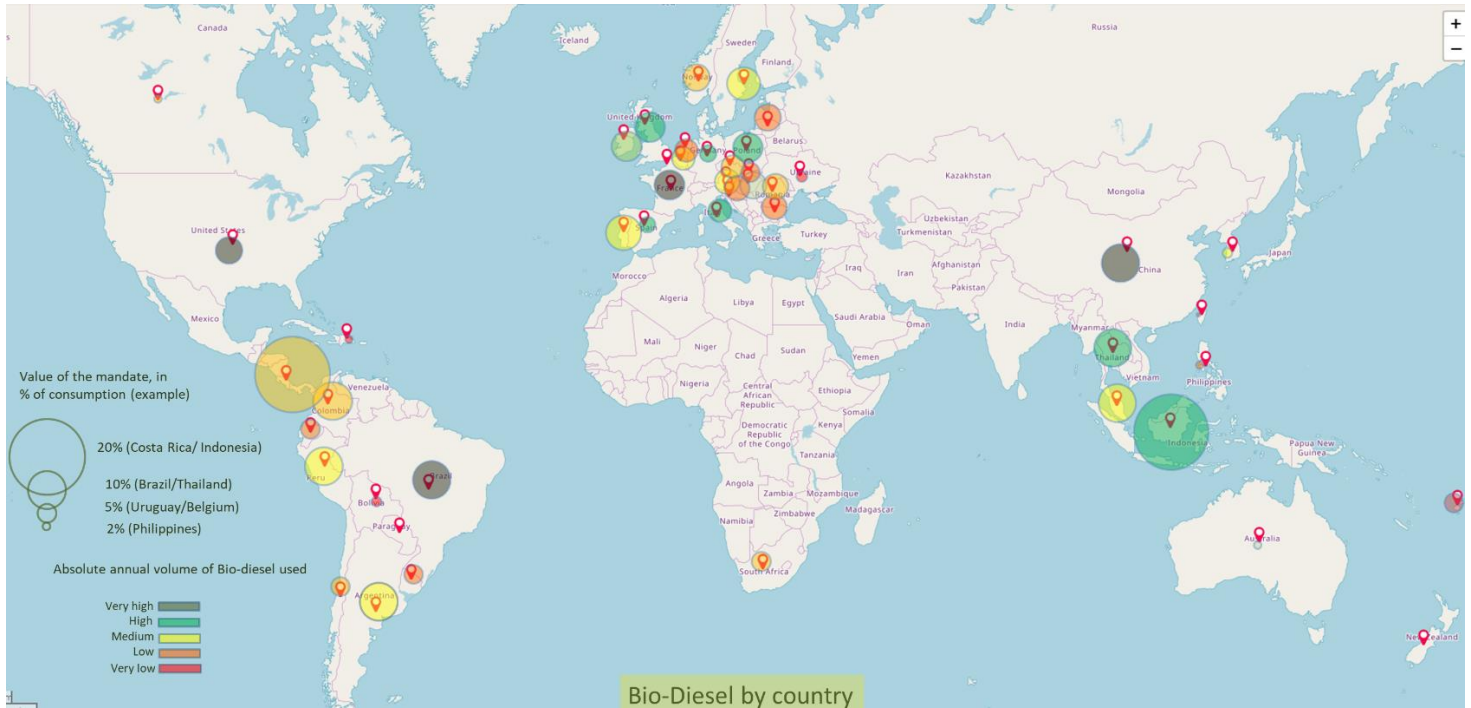


Figure 2 List of bio-diesel mandates and consumption by country

Following the same logic as with Fig.1, Fig.2 shows the bio-diesel mandates by country, displaying their strength and the scale of the annual consumption. An initial observation is that there are less bio-diesel mandates than there are bio-ethanol mandates. Partly for this reason, the colour scale is divided into five colors and not six, as in Fig.1. The mandates are not as ambitious for bio-diesel, as they are for bio-ethanol. Notable here are the mandates of Costa Rica and Indonesia, with a 20% mandatory blend. The countries with the highest consumption of bio-diesel are The United States, Brazil, France and China, followed by Germany, Then the United Kingdom, Italy, Spain, Poland, Thailand and Indonesia. Just like bio-ethanol, there is a high concentration of mandates around Europe, South America and this time South-East Asia.

Limitations

For the mandates collected in this analysis:

- The level of ambition from mandates is judged in terms of their value, which is defined as a percentage of the consumption of gasoline or diesel.
- The feedstock sources are ignored (it is important for life cycle assessments to include the entire supply chain), and only the final product is considered.
- Checking each country individually was out of the scope of this study. The selected mandates are those published in biofuel databases [1] [2] or official government/NGO presentations and reports [3] [4] [5] [6]. When possible, the information was double-checked against the specific country's mandates and laws. This was done specifically for the Americas (North, Central, and South).
- There might be mandates in other countries which are not displayed in the graph.

- For some countries the mandates are given as a range. For example, the Biodiesel mandate in Peru is stipulated to be 2-20%. In the graph only an intermediate value is displayed.
- The biofuel mandates are not static. They vary constantly based on feedstock availability, fuel prices, and economic situation of each country. It is common that a mandate is temporarily suspended or modified.
- Some countries have national policies that indicate a certain percentage of biofuels or renewable fuels but do not indicate if these are diesel and ethanol. In these instances, the analysis was applied for both. Examples of such countries are Sweden, Greece, Finland, Poland, Portugal, The Netherlands, and The United Kingdom.
- The United States, in most instances, frames their policy in terms of gallons, rather than in percentage. In this case a percentage was estimated to serve as a comparison to other countries.ⁱ

Conclusions

From the previous two figures, the following points can be highlighted.

- The mandates are not equally spaced around the world, but rather are prominent in specific regions. Based on the data presented there are clusters of bio-diesel mandates in Europe and South America, while bio-ethanol mandates are more evenly dispersed globally.
- The most notable countries for the implementation of mandates are North and South America, and Europe.
- The most notable countries for the consumption of biofuels (combined diesel and ethanol) are Canada, the United States, Brazil and Argentina in America. France, Germany, the United Kingdom, Ireland, Poland and the Netherlands in Europe. South Africa in Africa. China, Thailand and Indonesia in Asia, and Australia in Oceania.
- The strength of the mandates does not correspond to the absolute fuel consumption.
- The information regarding the strength of the mandates and the absolute consumption is dynamic and changes constantly, this information needs constant updating.
- More up-to-date information on the volumes of fuel consumed is required, it is expected that some of the countries would shift on the list given above, but the trends would be generally the same. For example, Germany could fall into the "very high" consumption category for bio-diesel (some older sources [10] suggests it consumes more than China, for example).
- Finally, some countries like the United States, Canada, Australia or Mexico have mandates per state which are more ambitious than the country's national targets. These regional mandates were ignored for the purpose of the analysis, as discretizing one country and not all of them would lead to higher uncertainties and biased data.

References

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ⁱ For the absolute fuel consumption:

- No absolute values are given for this in the graph, because these values are linked to high uncertainties. On one hand the uncertainty of the mandates (as above), and on the other, a lot of the information for volumes of fuel consumed is out-of-date.
- For this reason, only the trends are displayed which show the countries that consume the most and the least biofuels.
- The classification was made based mainly on two sources:
 - The annual consumption of diesel and gasoline was multiplied by the mandate percentage [7].
 - The annual reported consumption of bio-diesel and bio-ethanol was taken from 3 independent databases [8] [9] [10].
- Although the absolute values varied, the same trends were found in terms of the countries that consume the most and those who consume the least, with small exceptions.