

## Sizing Up China's Recently Announced 10% Ethanol Mandate

China recently (September 2017) announced a mandate to use ethanol for 10% of its gasoline-type fuels by 2020.<sup>1</sup> Given that China uses a large amount of fuel and ethanol accounts for only a couple percent of the fuel use to date, this mandate could imply a large expansion in demand for ethanol and feedstocks. As the Food and Agricultural Policy Research Institute at the University of Missouri (FAPRI-MU) develops its baseline outlook for the next 10 years – due for release in March 2018 – we investigate what this mandate could mean for markets.

A first look suggests large potential impacts, but also many mitigating factors. For instance, sugarcane ethanol is another potential source of supply if China turns to global markets. A look at the numbers suggests that this diversity of potential sources of ethanol and feedstocks is one reason to expect less pronounced impacts than the headline mandate volumes suggest, although still potentially a large market shock.

We use available data to convert the ethanol mandate into a volume of additional ethanol required and its feedstock equivalent (Table 1). Expected near-term fuel use times the 10% mandate gives a rough estimate of about 18 billion liters ethanol required if this policy is enforced, amounting to a 15 billion liter increase relative to the volume used for fuel in recent years. If made from either corn or sugarcane, then we calculate an additional demand of about 40 million tons of corn or nearly 200 million tons taken off the sugarcane market.

### Is the China ethanol mandate big or small? Scale of ethanol expansion.

| Volumes  | Sources |                              |
|--|---------|------------------------------|
| <b>Fuel use, billion liters (b.l), 2018-2020</b>   | 180     | FAS GAIN report              |
| <b>Mandated volumes if 10% mandate is imposed</b>  |         |                              |
| <b>Ethanol use, b.l</b>                            | 18      | Calculated based on policy   |
| <b>Historical ethanol production, 2015-17, b.l</b> | 3       | FO Licht                     |
| <b>Additional ethanol required, b.l</b>            | 15      | Calculated as difference     |
| <b>Additional in feedstock equivalent, m.t.</b>    |         | Calculated using conv. rates |
| <b>In corn equivalent</b>                          | 40      |                              |
| <b>In sugarcane equivalent</b>                     | 185     |                              |

These volumes are put into perspective by comparing them to some indicators of market size (Table 2). While this volume would require 4-5 times more domestic ethanol production, this would constitute one-quarter U.S.

1. See USDA/FAS GAIN Biofuels Annual report for the Peoples Republic of China titled, "Growing Interest for Ethanol Brightens Prospects", that was published online on October 10, 2017.

#### Summary:

*China announced an ethanol policy that could have important market impacts – if enforced as a mandate. If using recent market data to gauge scale, the effect also depends on whether they rely on domestically produced feedstocks or imported ethanol.*

#### For more on this topic, see these FAPRI-MU publications:

Report #03-17  
Baseline Update for U.S. Agricultural Markets

Report #02-17  
2017 International Biofuels Baseline Briefing Book

Bulletin #03-16  
Potential Impacts of the EPA's Proposed RFS Requirements for 2017

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ethanol production or about half of Brazilian ethanol production. The Chinese mandate does not look as big if compared to feedstock market indicators. In the case of corn, the treatment of distillers grains (DGs) co-produced with ethanol is an important consideration. After taking into account DGs, the ethanol expansion would in theory cause China's corn stocks of about 100 million tons to be depleted in less than 4 years. This volume would require a sustained 13% increase in domestic corn production, if supplied in the future from domestic sources – even before taking future fuel demand growth into account. If corn imports were permitted, then the corn requirement after taking ethanol into account would represent 8% of U.S. corn production and 3% of global corn production. If DGs are not accounted for, then the effects would appear roughly 30-40% larger based on the standard DG conversion rate.

### Is the China ethanol mandate big or small? Scale in feedstock markets.

#### Ethanol relative to historical (2015-17) values

|                                     |      |
|-------------------------------------|------|
| <b>Chinese ethanol production</b>   | 457% |
| <b>U.S. ethanol production</b>      | 26%  |
| <b>Brazilian ethanol production</b> | 53%  |

#### Corn equivalent relative to historical (2015-17) values

| <i>with or without accounting for distillers grains</i> | <i>with DG</i> | <i>no DG</i> |
|---|----------------|--------------|
| <b>Corn production in China</b>                         | 13%            | 18%          |
| <b>Chinese corn ending stocks</b>                       | 28%            | 40%          |
| <b>U.S. corn production</b>                             | 8%             | 11%          |
| <b>World corn production</b>                            | 3%             | 4%           |

#### Sugarcane equivalent relative to historical (2015-17) values

|                          |     |
|--------------------------|-----|
| <b>Brazil production</b> | 28% |
| <b>World production</b>  | 10% |

Sources: apart from calculations given above, ethanol market volumes are from FO Licht and volumes of feedstock market production are from OECD-FAO, with the exception of the assumption that Chinese corn stocks are about 100 MT.

In the hypothetical case that sugarcane supplies all this additional mandated ethanol, then the shock would be equivalent to 28% of Brazil's sugar production and 10% of global production.

Maybe the most reasonable expectation is to expect some mix of ethanol and feedstock sources to meet the mandate, if it is imposed as announced. For example, the mandated volume could be met by some combination of Chinese corn stocks and production, imported corn from the U.S. and other suppliers, and imported ethanol made from corn or sugar. This option would spread out the market shock more widely. Assessment presumably should take into account whichever markets could be used to source ethanol and its feedstocks, including sugarcane, in China and abroad. Ideally, an assessment would also consider other sources, including some that China already uses to make ethanol now, and any potential for China's support to advanced ethanol technologies will cause some new feedstock including cassava to become widely employed in the future.

Even so, assuming that global demand for these commodities is inelastic in the short- and medium-run, the price impacts would be larger than the volume impacts. Thus, while drawing on many potential sources spreads out the volume impacts, there could still be important price effects.

This question of scale assumes that the mandate will be implemented as announced. However, if the mandate is applied instead as a sort of target rather than a requirement, then there might be very little increase in ethanol use and no important market impacts at all.

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