This comment is being submitted in response to the proposed fuel pathway for molasses ethanol produced by the Raizen Energia S. A.’s Costa Pinto Mill (COPI) located in Piracicaba, Brazil. This fuel pathway was posted for comments on December 17, 2013.

In it, Raizen proposed a carbon intensity (“CI”) of 14.67[[1]](#footnote-1) for all ethanol produced at COPI where the feedstock is molasses. Raizen used a **mass-based allocation method** to determine the proposed CI for its molasses ethanol. Since molasses is a byproduct of sugar production, Raizen used an allocation of the GHG emissions arising from the production of molasses ethanol in comparison with the emissions arising from sugar production. It calculated the ratio of the total reduced sugars (TRS) in the molasses entering the distillery to the TRS that enter the sugar production process of each ton of sugarcane that enters the factory gate.

However, we believe that the mass-based allocation method used by Raizen is not the correct method for an integrated biorefinery like COPI where molasses is not merely a low-value byproduct of sugar production, but rather is, from the outset, solely a feedstock for the ethanol part of the plant.

In support of our position, we note that the authority that CARB uses in determining the CI for ethanol produced from molasses expressly does not use a mass-based allocation, but rather an allocation based on the market value of raw sugar as compared with the value of molasses. That authority is the Environmental Research Letter written by Anand R. Gopal and Daniel M. Kammen of UC Berkeley published on October 16, 2009. That Letter is hereinafter referred to as “Gopal/Kammen”.

Gopal/Kammen came up with the fuel pathway for molasses-feedstock ethanol to reward the use of a truly low-value feedstock to make ethanol[[2]](#footnote-2). They expressly chose the **market value allocation method** for determining the CI of molasses ethanol so that as the value of molasses goes up because it’s more valuable as a feedstock for ethanol, the CI of molasses ethanol will become the same as the CI of ethanol made from sugarcane juice.

It’s worth noting that Gopal/Kammen has been the supporting authority for each of the three Method 2B molasses ethanol pathway applications submitted to CARB prior to the COPI pathway, although Raizen did not include it as a supporting document for the COPI application.

We believe the reason is that, for each of the three prior applicants, molasses truly was a low-value by-product of the sugar production process. See the descriptions of the plants and their molasses feedstocks in the respective Method 2B applications of PT Indolampung Distillery of Sumatra, Pantaleon of Guatemala and Nicaragua Sugar Estates Limited of Chichigalpa, Nicaragua.

However, that’s not the case for COPI. According to its submission, it does not sell molasses to third parties. Rather, it is an integrated sugarcane ethanol/sugar biorefinery, meaning that both ethanol and sugar are produced at the mill. Given its location in the premier ethanol producing state of Sao Paulo, the molasses byproduct is solely a feedstock for ethanol. As described by Gopal/Kammen on p. 2,

“In integrated factories, sugarcane is crushed at a mill that produces both sugarcane juice, which is rich in sucrose, and bagasse, which is used to meet the energy demand of the entire factory. The factories then **split the juice into two streams sending one part for raw sugar production and the other part to the ethanol distillery**. [Emphasis added]. Molasses, which is a byproduct of raw sugar production is then sent as additional feedstock to the distillery.

It’s also worth noting that “[a]lthough the fermentable sugars in the molasses cannot be further upgraded to raw sugar, they can be converted to ethanol in a distillery.” Gopal/Kammen, p.2.

Therefore, when COPI produces sugar, it will have a molasses byproduct that can’t be converted to sugar, so it either has to use the molasses to make ethanol, or it has to dispose of the molasses in some other way. However, accordiing to Gopal/Kammen on p.3, molasses “is a difficult product to store and transport and hence only about 15% of the molasses sold worldwide is traded internationally.”

A cost benefit analysis of the use of the molasses as a low-value byproduct as opposed to an additional feedstock for ethanol production is clear. Why deal with the difficulties and expense of transporting molasses in a state where there would be many competing suppliers when COPI can simply feed it into the distillery on-site to make the much higher value ethanol?

And, in fact, Raizen does not sell any molasses that it produces as a byproduct of the sugar process to third parties, even though Sao Paulo state, where it’s located, is a big cattle raising state.

In conclusion, if CARB were to approve the COPI application as is, we would end up with an absurd result: When COPI produces ethanol from sugarcane juice, as it normally does, its CI will be 58. When it instead uses the molasses left over from making sugar, its ethanol will have a CI of 14.93. This would be the case even though both types of ethanol come from the same sugarcane harvested in the field. The CI of the respective ethanol produced would turn on how the streams of sugarcane juice are split once the cane is crushed. That can’t be the arbitrary result that CARB intended.

1. CARB staff came up with a CI of 14.93 when it calculated the CI using the mass-based allocation method for COPI’s molasses-based ethanol. [↑](#footnote-ref-1)
2. Typically, molasses is sold to third parties as a cheap cattle feed supplement. [↑](#footnote-ref-2)