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NATIONAL ACADEMIES OF SCIENCES, ENGINEERING, AND MEDICINE
CURRENT METHODS FOR LIFE CYCLE ANALYSES OF LOW-CARBON TRANSPORTATION FUELS IN THE UNITED STATES
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The RFA appreciated Dr. Hileman's presentation today and fully supports the adoption of sustainable aviation fuels (SAF) and the development of methods to estimate their life-cycle greenhouse gas emissions. Our comments are specific to the current default emissions values for SAF established under the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) that Dr. Hileman had a key role in developing as the co-rapporteur of the Fuels Task Group of the International Civil Aviation Organization (ICAO) Committee on Aviation Environmental Protection (CAEP).

The default values appear to be based on outdated models and data. Specifically, it is our understanding that the emissions estimates for alcohol-to-jet fuel made from corn ethanol were based a 2014 MIT study that used a 2012 version of the GREET.Net model and other data from studies published from 2007 to 2012[1], as well as a European Commission Joint Research Council study using 2006-era data from a private data set known as the "E3 database."[2]

Regarding indirect land use change, the amortization period of 25 years assumed for CORSIA is a contributing factor to an overstatement of emissions estimates. In the U.S., which is the focus of this committee, a longer amortization period is generally used.

Additionally, at a minimum, any framework relying on default emissions values should have separate values for the U.S. average corn ethanol mix and for dry-mill ethanol, as the latter accounts for 90% of U.S. production and tends to have significantly lower GHG emissions than wet-mill ethanol.

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[1] Staples, M. D., Malina, R., Local, H., Pearls on, M. N., Hileman, J. I., Bowies, A., & Barrett, S. R. (2014). Lifecycle greenhouse gas footprint and minimum selling price of renewable diesel and jet fuel from fermentation and advanced fermentation production technologies. Energy & Environmental Science, 7(5), 1545-1554. ICAO says it "updated" the ethanol-to-jet pathway found in Staples et al. using a 2017 version of GREET, but it isn't clear what changes ICAO made.
[2] Ludwig-Bulow Systemtechnik GMBH. (2006). E3 Database. Retrieved May 15, 2017, from http://www.e3database.com/

Finally, the ICAO baseline for petroleum-derived jet fuel is 89 g/MJ, according to ICAO methodology (subsection (d)(2)(A)). ICAO doesn't provide detail or analysis to support this baseline jet fuel value, which is lower than the life-cycle estimates from other methodologies and models. Notably, some studies estimate the carbon intensity of petroleum-based jet fuel to be as high as 109.3 g/MJ in the U.S. and 105.7 g/MJ in the European Union.[3]

Given these issues, it is questionable whether the ICAO methodology reflected in the current default emissions values should be considered best practices for purposes of the National Academies of Sciences life-cycle analysis committee. The CORSIA program is in its initial pilot phase, and we know that estimates used in other programs such as the California Low Carbon Fuel Standard have been refined significantly during the course of their implementation. The RFA hopes the committee will keep this in mind in reviewing the current ICAO methodology and considering its implications for the life-cycle analysis of SAF in the U.S.

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[3] See Stratton RW, Wong HM, Hileman JI. Life cycle greenhouse gas emissions from alternative jet fuels. 2010. Also, European Commission. Study on actual GHG data for diesel, petrol, kerosene and natural gas. 2015.