ARB Expert Working Group
Uncertainty subgroup

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Two large areas of work seem most important for this subgroup: (I) better characterization of the uncertainty surrounding estimates of ILUC discharges for various biofuels and ways to reduce it, and (II) exploration of policy responses by ARB to residual and refractory uncertainty in fuel GWI estimates.

I. Uncertainty in GWI estimates

A. Characterizing uncertainty

ILUC is currently estimated by a (growing) number of (mostly) CGE-based models that have produced different values and describe their own internal uncertainty differently (including not at all). They are not, generally, estimating the value of the same well-specified 'random variable' (the 'true value' of a fuel's GWI has different operational definitions implicit in the models themselves). The internal uncertainties of these models, and the variation they imply collectively for GWI, need to be described in some systematic way, and the description can follow a variety of protocols, from a proper probability density function whose parameters are functions of model estimates (and possibly other information) to ranges of possibility (Plevin, O'Hare et al. 2010).

B. Reducing uncertainty

Better CGE modeling and better data will probably narrow our range (however defined) of estimates for ILUC values; more different models may broaden it or narrow it. These will improve the LCFS' implementability and public credibility, and are uncontroversially good to do. Much of this work is the province of other subgroups, however, as they are mostly focused on improving accuracy, we will provide the ARB a ranking of the research areas likely to reduce uncertainty in GWI estimates most, along with a description of what work of this kind is under way where.

II. Policy accommodation to uncertainty

Advances in analysis and data in the next few years will still leave estimates of ILUC (and total GWI) for biofuels with a large uncertainty band. Fossil fuel GWI is not known with complete certainty either. However, the LCFS as presently implemented requires an "operational GWI", the number a distributor uses in calculating his AFCI, for each fuel with infinite precision. Whatever formalization is chosen for aggregated knowledge about the 'real' GWI of a given fuel (some form of probability density function is probably the best way to think about this formalization), it has been implicit in discussion to date that the operational GWI value is a mean or most likely value implied by this function. However, it is typical of regulatory practice in a wide range of contexts from building codes to health, safety, and environmental regulation, to use an operational value that differs, sometimes widely, from this 'most likely' estimate. The operational value properly recognizes two features of the decision not sufficiently studied in the context of the LCFS: asymmetry in the probability distribution for the real value, and the cost of being 'wrong'. The latter, in turn, demands attention to the differences among GHG discharges, warming as of a date or over a period, and social cost (2010).

A. Cost of 'error'

If the operational GWI of a fuel is higher than the real value, less of it will be used than the discharge-minimizing amount; if too low, too much fossil fuel will be blended. For a given error, however, the costs may be different depending on the sign; is it worse to be too high or too low by, say, 10 g/MJ? These costs include primarily extra warming (which is not the same, owing to time effects, as extra GHG discharge), but also effects on fuel markets over time, social adaptation in fuel producing areas, water consumption, food consumption and prices, etc. etc. Which of these costs are counted (is the LCFS only a GHG policy?); whichever are included, what is the shape and symmetry of the function that describes the cost of error? Is there a "safe side" on which to err, and if so, which is it? These questions are central to ARB's making the best choice given the information available.

B. Policy recognition of uncertainty

The "safety factor" discussion above refers to one, but not the only possible, mechanism by which regulation can explicitly account for uncertainty in its scientific base. (Doremus 2005) The subgroup is not far advanced on this task, but hopes to be able to present alternative ways LCFS implementation can explicitly respond to uncertainty in ILUC and other relevant scientific estimates.

Other jurisdictions, including the UK, the EC, and the northeast states, are confronting our issues in different ways. We will provide the ARB with a description of how agencies regulating biofuels are, or are not, incorporating uncertainty into their practice.

_____(2010). Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. Interagency Working Group on Social Cost of Carbon, US Government

Doremus, H. (2005). Science plays defense: Natural resource management in the Bush administration. Ecology Law Quarterly 32:249-306

Plevin, R., M. O'Hare, et al. (2010). The greenhouse gas emissions from biofuels' indirect land use change are uncertain, but may be much greater than previously estimated. Unpublished, in review at Environmental Science and Technology.