

For attention of: The California Air Resources Board
From: Dr Chris Malins, Cerulogy
Date: 28 September 2023
Subject: Public Meeting to Hear an Update
on the Low Carbon Fuel Standard

I have been engaged with California's Low Carbon Fuel Standard for over a decade now, having served on the Advisory Panel for the staff review of the standard in 2011 and 2014, conducted compliance scenario modeling for the standard on several occasions and engaged with ARB staff on various aspects of the standard and the associated underlying analysis through this period. I am pleased that the California LCFS remains an exemplar of regulating to reduce the climate impact of transport energy use for other jurisdictions in the USA and beyond, and I am encouraged that the California Air Resources Board continues to look to develop and innovate the standard with a view to meeting the evolving challenge of reducing the climate impact of the Californian transport sector while delivering environmental co-benefits where possible and avoiding deleterious side effects where possible.

One issue on which ARB Staff have solicited feedback is the role of food-crop-based biofuels under the LCFS, and whether this should be constrained, either by limiting the contribution of such fuels towards meeting LCFS requirements or through the imposition of additional sustainability requirements. The use of food crops as biofuel feedstock has been considered potentially problematic on two main grounds. Firstly, there is still uncertainty regarding the indirect land use change (ILUC) emissions induced by the use of food commodities as biofuel feedstock. California has provided leadership in the integration of estimated ILUC factors in regulatory GHG assessment, and the ILUC factors currently required in the regulation play an important role in balancing the value signals to food-based alternative fuels and to other transport decarbonization options. Nevertheless, it is generally acknowledged that ILUC estimation is fundamentally uncertain, and therefore there is a risk that the real ILUC emissions associated with the use of these fuels are larger than the regulatory estimates. I and other stakeholders have also previously identified questions relating to specific elements of the implementation of ILUC modelling in the GTAP framework¹, and I would not be confident that additional GTPA modelling would provide improved estimates. Secondly, there is a legitimate concern that largescale use of food commodities as biofuel feedstock puts inflationary pressure on food commodity prices, in a way that has deleterious impacts on food consumers that are felt most strongly by poorer net food consumers in the developing world. While there is a constituency around the biofuel industry that continues to deny that these concerns are justified, most commentators take it as obvious that increases in the use of food commodities for biofuel support higher prices, and this is supported by extensive evidence and analysis.²

In addition to these more fundamental concerns relating to the impact of food-based fuels, there are practical questions about the extent to which the LCFS delivers net benefits when it promotes HVO renewable diesel use in California in the context of national RFS blending

¹ See e.g. <https://www.sciencedirect.com/science/article/abs/pii/S0959652620307630>

² I provided a review of some of this evidence in a 2017 paper: <https://www.cerulogy.com/thought-for-food/>

requirements. The vast majority of renewable diesel consumption in the U.S. has occurred in California due to the added value signal from the LCFS, but the total volumes supplied have been largely consistent with the volumes required by the RFS biomass-based diesel and advanced biofuel mandates.³ This suggests that the LCFS has had limited impact on total volumes of renewable diesel being produced, although it is reasonable to conclude that the LCFS has contextualized the preference of renewable diesel manufacturers to process secondary oils that allow lower carbon intensity pathway values. Even this feedstock choice may have delivered only limited net benefit, however, as the available resources of lower-quality oils and fats would in most cases have been used productively even without the value signal from the LCFS, either as feedstock for biofuels for more widely distributed consumption, or in other applications such as animal feed and oleochemicals.

In Europe, concerns about the sustainable scalability of food-based biofuel production have led the governments of the European Union and United Kingdom to place maximum limits on the contribution of food-based fuels to transport sector decarbonization targets. Beyond this, aviation sector alternative fuel policies that are in the process of being introduced in the EU and UK will entirely exclude food-based aviation fuels from being counted towards regulatory targets.

The rapid expansion of renewable diesel (and latterly renewable jet) capacity in the U.S. and globally is putting considerable pressure on vegetable oil markets globally. The U.S. EPA has identified limited resource availability as a key reason to manage the growth of the biomass-based diesel mandate in recent years. If the LCFS value signal brings ever growing volumes of renewable diesel from soy and secondary oils into the California market, this will limit the extent to which the LCFS can support the expansion of more scalable and sustainable decarbonization solutions. I therefore support the ARB staff in considering measures to limit the role of lipid-based biofuels in complying with California targets – given the interchangeability of soy oil with secondary oils and fats in most applications, I recommend that the ARB should consider limits to lipid-based fuels in general, rather than only on those fuels produced directly from food resources. The impact on cereals markets through ethanol supply is more moderate, partly due to the limiting role played by the blend wall, but with the development of ethanol-to-hydrocarbon technologies it is also appropriate for the ARB to give careful consideration to whether any limits would be appropriate on the role of cereal-derived fuels in the LCFS.

The SRIA on possible 2023 updates to the LCFS further identifies a number of important issues to be addressed to make sure that the standard remains effective and relevant to 2030 and beyond.

Carbon intensity benchmarks

Setting an appropriate level for the stringency of the program is vital to ensuring that it continues to deliver on its potential as a driver of GHG emission reductions, and as a driver of the innovations that are needed to deliver even deeper GHG reductions as California aims at net zero in the coming decades. I welcome the proposal to increase the stringency of the program, and the provision of supporting analysis through the SRIA. Ensuring that

³ Cf. <https://www.cerulogy.com/animal-vegetable-or-mineral-oil/>

the LCFS credit price remains at a meaningful level able to support investment will enable the LCFS to remain a driver of innovative low carbon practices.

Acceleration mechanism

I am very supportive of the concept of introducing an acceleration mechanism to the LCFS. Having been involved in the design of the credit clearance mechanism, I recognize the value of having defined mechanisms in place that support robust demand for LCFS credits against the context of variable rates of fuel availability and unpredictable deployment rates for electric drive train vehicles. I welcome the ideas for an acceleration mechanism discussed by CARB staff in the May workshop, and the additional thinking brought to the table by other workshop participants, though I have not reviewed the suggested mechanisms in enough detail to provide a firm recommendation for a given trigger mechanism and/or threshold value.

It may be pertinent to note that the current German implementation of the recast Renewable Energy Directive features an acceleration mechanism alongside a GHG intensity reduction target. Germany's "Immission Control Act"⁴ establishes a GHG intensity target for the transport sector out to 2030, and includes a provision to raise the stringency of this target in the event that adoption of electric vehicles is more rapid than anticipated, and therefore that electricity use makes a larger carbon intensity reduction contribution than expected⁵. Specifically, the Act stipulates that if the amount of electricity supplied to the road sector exceeds a certain threshold (defined annually), the overall transport target may be adjusted by between ½-1½ times the equivalent GHG contribution of the excess electricity, at the discretion of the administrator. As California LCFS credit generation is increasingly sensitive to the rate of expansion of the electric vehicle fleet, there may be merit in considering a specifically EV-deployment-linked facet to a California acceleration mechanism.

De-exempt fossil jet

Given that there is a renewed interest in delivering alternative fuels into the aviation sector, it is appropriate that aviation users should be asked to share the burden of supporting transport sector decarbonization by adding fossil aviation fuels used on intrastate flights to the standard.

Phase out avoided methane crediting and revise biomethane deliverability rules

The combination of avoided methane emissions crediting and indirect accounting for biomethane supply has made the LCFS a very attractive market for products, notably dairy and swine manure (DSM) gas, that have been allowed to register a large avoided-methane credit as part of their GHG pathway values. This has made LCFS an effective driver of methane capture at affected facilities, but has arguably had a distorting effect in

⁴ <https://www.gesetze-im-internet.de/bimschg/>

⁵ Ibid. § 37h (2)

this market. The LCFS is generally associated with a higher carbon price than is supported under e.g. the California Cap-and-Trade program, and this is driven by the higher cost of delivering decarbonization in the transport sector. The current accounting rules allow the capture of DSM methane to be treated as a transport sector emission reduction because the GHG benefit from avoided methane emissions are 'bundled' with the GHG benefit of replacing fossil natural gas with biomethane. An argument can be made that avoided methane from the livestock and dairy industries should be treated as an emission reduction in those sectors, and not as a transport sector emission reduction, i.e. that the benefit of methane emission avoidance should be accounted in a sector with a lower carbon price than the LCFS. It is also appropriate to review whether it is indefinitely appropriate to assume ongoing methane release as a baseline condition for these DSM management systems. I therefore support the ARB in looking to revise the treatment of DSM methane under LCFS. I would also invite the ARB to consider whether there is a case to 'unbundle' the methane avoidance term from biomethane use from the natural gas displacement term, for example by shifting methane avoidance credit from LCFS credit generation to Cap-and-Trade allowance generation. I support the ARB in reviewing the deliverability requirements, though it is important that any revised deliverability rules should avoid placing undue burden on biomethane users.

ZEV infrastructure crediting for heavy duty

As the use of ZEVs in medium and heavy duty applications grows, I support the ARB in seeking to extend infrastructure crediting options from the passenger vehicle segment to the medium and heavy duty segments.

Book and claim accounting for hydrogen

I support aligning thresholds for the carbon intensity of hydrogen to the Inflation Reduction Act, and I believe it is appropriate for the ARB to consider extending indirect accounting rules to hydrogen.

Project based crediting

In the context of the reducing consumption of petroleum products in the transport sector, phasing out crediting of petroleum projects by 2040 seems reasonable. As regards direct air capture, I would encourage the ARB to carefully consider in which circumstances it is useful and reasonable to treat emissions reductions delivered using direct air capture as transport sector emissions reductions.

Electric forklifts

Reducing the crediting of forklifts in market segments that are (more or less) wholly electrified seems a reasonable response.