Ongoing work and the receipt of more recent data since the release of the LCFS Initial Statement of Reasons (ISOR) necessitate an update to the analysis of the LCFS Compliance Curve included in the ISOR. This paper brief describes what has been updated and, in Table 1 “Analysis of Compliance Curve with GREET 2.0 CIs and 2014 LRT Data”, presents the effect of these updates on credit generation.

While this update affects parts of the analysis, most of what was included in the ISOR has not changed. For example:

- The proposed compliance curve is the same as in the ISOR
- Sufficient credit generation is expected through 2025 to offset deficit production
- The amounts and mix of credit generating fuels used between 2015 and 2025 is the same as in the ISOR, and
- The gradual improvement in fuel CIs with time continues to be reflected in the analysis

The updated assessment now applies the carbon intensity (CI) values derived from GREET 2.0 beginning in 2016, incorporates data on fuels and CIs entered into the Low Carbon Fuel Standard Reporting Tool (LRT) for all four quarters of 2014, reflects the use of the Low-Energy-Use Refinery provision and improves the method used to calculate credit generation from natural gas. Each of these subjects is discussed below.

1. Changes to CIs to Reflect GREET 2.0 Values
   a. Changes to the CIs for CARBOB, CARB Diesel and CaRFG

Recent work has resulted in minor changes to the CIs for CARBOB, CARB diesel and CaRFG from those modelled in the ISOR. These changes have relatively small impacts on the calculation of credit and deficit generation. The following values are used in the updated LCFS illustrative scenarios beginning in 2016:

- CI for CARBOB of 100.53 grams/MJ rather than 100.58
- CI for CARB Diesel of 102.76 grams/MJ rather than 102.82
- 2010 base CI for CaRFG of 99.11 grams/MJ rather than 98.18
b. Changes to CIs to Reflect GREET 2.0 Values for other Fuels

Fuel CIs for ethanol, hydrogen, electricity, renewable diesel, biodiesel, and natural gas have all been updated to make them consistent with the values derived from GREET 2.0. These revised values are applied in 2016, and are shown in Table 1.

c. iLUC Changes

Indirect land use effects (iLUC) have been updated to reflect the values used in GREET 2.0 for several crop-based biofuels starting in 2016. The principal changes that are used were:

- The iLUC value used for corn-derived ethanol is 19.8 grams/MJ,
- The iLUC value for cane-derived ethanol is 11.8 grams/MJ, and
- The iLUC value for soy-derived biodiesel is 29.1 grams/MJ

These values are incorporated into the CI values shown in Table 1.

2. Changes to Reflect 2014 Data from the LCFS LRT

New data from the LRT has become available since the LCFS ISOR was released. Most entities have now filed their reports for the fourth quarter of 2014. Staff used this data to modify the fuel volumes and average CIs used for 2014 in the analysis of the LCFS Compliance Curve. Fuel amounts were updated for all fuels but electricity. The revised values are shown in Table 1. Overall credit generation in 2014 is about 0.75 MMTs lower than previously estimated while deficit generation was basically unchanged.

3. Changes to Improve the Credit Generation Estimates for Natural Gas

Two changes in the methodology to calculate the credits from natural gas (NG) were incorporated into the updated analysis. These were:

- Inclusion of the use of NG by light and medium duty vehicles under the “gasoline” standard, and
- Application of the proper EER in the calculation of credit production when NG is used

Roughly 12 percent of the NG used in 2014 was in the light and medium duty vehicle category. Additionally the previous analysis failed to apply the 0.9 EER affecting credit

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1 So far, the 2014 transportation electricity use reported in LRT does not include the 3rd and 4th quarters non-metered residential charging data from utilities. However, based on the filings for the 1st and 2nd quarters, the values used in the ISOR for 2014 are consistent with the expected use of electricity in 2014 and have been retained.
generation by heavy duty-spark ignition vehicles that use NG. The updated analysis corrects this issue.

The analysis was not modified in terms of future projections of overall NG use. It was assumed that there would be little growth in the use of NG in light and medium duty vehicles, and that use was kept constant through 2025. The volumes on NG used by heavy duty vehicles were adjust downward to reflect the amount used by light and medium duty vehicle.

4. Changes to the Provisions for Low-Energy-Use Refiners

The updated analysis estimates that this provision will decrease deficit generation by 0.15 MMTs per year starting in 2016. This reduction is now included in Table 1 in the estimate of refinery credits, which otherwise remain unchanged.

5. Overall Impact of the Updated Analysis

Annual credit production in is somewhat less in 2014 than in the previous analysis, and generally just slightly less thereafter until around 2020. However, while the amount of credits carried over is less there are ample credits trough 2020 and more credits than deficits available for the entire period from 2016 through 2020. The table below provides compares the credit balances at the end of each year in the ISOR analysis with those in the updated assessment. The detailed results are shown in Table 1.

| Million Metric Tons of Banked LCFS Credits at End of Year |
|-----------------|---|---|---|---|---|---|---|---|---|---|
| ISOR            | 12.6 | 14.7 | 15.4 | 12.5 | 6.2  | 3.2  | 2.5  | 4.1  | 7.8  | 13.5 |
| Updated         | 11.4 | 13.2 | 13.8 | 10.7 | 4.5  | 1.6  | 1.1  | 3.1  | 7.2  | 13.3 |
| Difference      | 1.2  | 1.5  | 1.6  | 1.8  | 1.7  | 1.6  | 1.4  | 1.0  | 0.6  | 0.2  |

As previously stated, many other mixes of low CI fuels and innovative credit creation are possible, and the eventual mix of fuels used will be different from this assessment.
### Table 1 -- Analysis of Compliance Curve With Greet 2.0 CIs and 2014 LRT Data

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<td>Gasoline Std</td>
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<td>97.99</td>
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<td>Diesel Std</td>
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<td>Alcohol EER</td>
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<td>Average Annual CI Assumptions for Each Fuel (g/MJ) (Revised in Draft 3-25-2015)</td>
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