

November 16, 2011
DRAFT for Discussion with LCFS Advisory Panel

VI. Meeting the Targets and Assessment of Whether Adjustments Are Needed

A. Introduction

The LCFS requires regulated parties to reduce the carbon intensity of their transportation fuel pools by at least 10 percent by 2020. To this end, separate compliance schedules establish yearly CI targets through 2020 for gasoline, diesel, and their substitutes. During the early years, the “back-loaded” LCFS sets modest targets to allow for the long-term development of lower-CI fuels, needed to meet the standard later in the decade (see Appendix A), and for increased market penetration by alternative-fueled vehicles using such lower-CI fuels. Meeting the targets may be achieved through various means, including but not limited to, purchasing low-CI biofuels, using credits previously generated, or acquiring credits from other parties to offset deficits.

For this review, the Panel was interested in the following: the capability of regulated parties to meet the targets in the near- and mid-term; the generation of credits to assist compliance in later years; the compliance challenges regulated parties might encounter in later years; and whether current data, coupled with plausible assumptions, are sufficient to estimate compliance capability for the next several years.

While this chapter provides staff’s review of these topics with the Panel’s input, it is important to reiterate that this 2011 evaluation was conducted during the first year of full program implementation. This assessment is based on the best information available, including the information from the first year of program implementation. Staff anticipates that more extensive data, reflecting actual compliance and investment strategies being used by regulated parties, would be available by the next scheduled formal review in 2014. Staff also plans to continue to update the Board on the implementation of the LCFS between the formal reviews.

To address the topics required to be addressed as well as those suggested by the Panel, this chapter is organized as follows:

- Meeting Near-, Mid-, and Long-Term Targets
 - 2009 Illustrative scenarios
 - 2011 Illustrative scenarios
 - First and Second Quarter 2011 Credit/Deficits Generated
- Strategies for and Challenges to Meeting the Targets
- Potential Flexible Compliance Mechanisms
- Summary and Conclusions

B. Meeting Near-, Mid-, and Long-Term Targets

Based on its assessment, ARB staff is confident that regulated parties can meet the near and mid-term (through 2017) targets required under the LCFS. There are two reasons for this conclusion: 1) updated illustrative scenarios (discussed in section A2 of

this chapter) show various plausible paths to meeting the targets through 2015-2017 or beyond; and 2) analysis of information submitted to the LRT shows substantial credits generated in Q1 and Q2 of 2011. These credits, along with credits to be generated in the next several years, in which the program targets are fairly modest, will likely be banked by the credit owners for use in later years, or traded to other regulated parties under favorable market conditions.

1. Original 2009 Illustrative scenarios

For the 2009 rulemaking, staff produced a set of illustrative scenarios that relied, in part, on California receiving its proportional share of the cellulosic ethanol volumes originally mandated in the RFS2. The RFS2 is a program run by U.S. EPA that requires specific volume amounts of biofuels by 2022, including corn ethanol, biomass-based diesel, advanced biofuels, and cellulosic biofuels. The original 2009 scenarios showed that California would be able to meet the 2020 LCFS requirements.

Since 2009, the United States Environmental Protection Agency (U.S. EPA) has drastically reduced the mandated volumes of cellulosic ethanol, and the Energy Information Administration (EIA) has significantly reduced its projections of cellulosic ethanol production over the next 10 years. The reduction in the amount of low-CI, cellulosic ethanol in the market has generated concerns that regulated parties may not be able to meet the LCFS requirements after the next couple of years. Therefore, updating the illustrative scenarios is an important consideration in estimating whether regulated parties can meet LCFS targets and if there is a need to adjust the compliance schedule.

2. Updated 2011 Illustrative scenarios

Based on current and developing fuel and vehicle technologies, feedstock availabilities, and other factors, ARB staff has analyzed a number of illustrative scenarios to illustrate potential outcomes under various circumstances. The objective of the scenarios is to help address questions regarding the ability of regulated parties to meet the CI reduction targets required under the LCFS.

In this analysis, staff presents fourteen illustrative scenarios – eight for gasoline and its substitute fuels and six for diesel fuel and its substitute fuels. These scenarios include a mix of fuels and strategies that may satisfy the LCFS targets. As noted, these scenarios are different from the 2009 illustrative scenarios for various reasons, including the assumptions used and the substantial reduction in the RFS2 mandate for cellulosic ethanol. Appendix B provides a brief comparison of the main differences between the 2009 and 2011 illustrative scenarios. As the LCFS program moves forward, staff will continue to monitor the factors built into the scenarios.

The 2011 illustrative scenarios illustrate how the CI standards might be met, based on various assumptions about future conditions. These scenarios are not predictions or forecasts, but rather illustrations of plausible combinations of fuels that could meet the LCFS targets (along with the vehicles that would use such fuels). The illustrative scenarios shown in this report represent only a few of the possible scenarios that could

be evaluated. A full assessment of all such possible scenarios is beyond the scope of this report.

The rate of future fuel and vehicle technological development remains uncertain. The technologies that are most likely to produce commercial quantities of lower-carbon fuels, or the vehicles designed to use such fuels over the near- to mid- term could encounter delays. The development of other, currently less well-developed technologies, could achieve breakthroughs. In addition, since the proposed regulation is performance-based, fuel producers and importers can decide on how to achieve compliance. One or more of these outcomes could result in a set of compliance scenarios that is different from those described below.

a. Common Scenario Assumptions

For all the revised gasoline and diesel scenarios, staff used several common assumptions. The common gasoline and diesel assumptions are presented in Appendix C; these assumptions are based on regulatory mandates (e.g., low emission vehicle regulation) and expected technological advances.

b. Gasoline and Diesel Scenarios

As noted, staff developed eleven illustrative gasoline and six diesel scenarios using different assumptions as shown in Tables V-1 and V-2 below. For a more-detailed look at the scenarios in tabular form, please refer to Appendix V-C.

Table V-1. Summary of Updated 2011 Illustrative scenarios for Gasoline

<p><i>Scenario 1: Cellulosic and corn ethanol future; credit banking</i></p>	<ul style="list-style-type: none"> • California gets about 85 percent of EIA cellulosic projections; E15 by 2016. • Low corn ethanol use in 2016 and after; large FFV use using E85 50 percent of the time; • Substantial early surplus credit generation before 2017; • Annual deficits generated between 2017 and 2020, but some credits remain after 2020;
<p><i>Scenario 2: Increased cellulosic ethanol, FFVs and Credit Banking</i></p>	<ul style="list-style-type: none"> • California gets nearly all (about 90 percent) of EIA cellulosic projections; E15 by 2016. • Low sugarcane ethanol use and low corn ethanol use in 2020; relatively low FFV use; • Fueling with E85 about 50 percent of the time before 2018 and about 60 percent of the time after; substantial early surplus credit generation before 2017; • Annual deficits generated between 2017 and 2020, but some surplus credits remain after 2020;
<p><i>Scenario 3: Delayed Cellulosic Ethanol Future</i></p>	<ul style="list-style-type: none"> • Delayed cellulosic ethanol introduction; mostly corn ethanol used until 2015; • Increasing sugarcane ethanol use through 2020; E15 by 2016. • California gets about a quarter to a third of EIA nationwide cellulosic projection; • High FFV use beginning in 2015 using E85 a high percentage of the time; • Surplus credits accumulate until 2019; • Deficits generated in 2019 and 2020, but some surplus credits remain after 2020;
<p><i>Scenario 4: Lesser Cellulosic Ethanol Future</i></p>	<ul style="list-style-type: none"> • Only corn and sugarcane ethanol until 2015; high corn and sugarcane ethanol through 2020; • Cellulosic ethanol introduced in 2015 up to only about a third of EIA nationwide projection for 2020; very high FFV use, fueling with E85 100 percent of the time; • Less surplus credit accumulation before 2019 than in Scenario 3; • Deficits generated between 2018 and 2020, but some surplus credits remain after 2020.
<p><i>Scenario 5: Drop-in Fuel Future</i></p>	<ul style="list-style-type: none"> • Small amounts of cellulosic ethanol begins in 2014; drop-in fuel begins in 2015; E15 by 2016. • Cellulosic about 25 percent of EIA 2020 nation-wide projection; • No FFVs; substantial surplus credits in early years; • Deficits generated between 2018 and 2020, but some surplus credits remain after 2020;
<p><i>Scenario 6: Complete technology shift future</i></p>	<ul style="list-style-type: none"> • Only corn ethanol is used until 2014; sugar cane ethanol and cellulosic ethanol begin in 2014; Drop-in fuel begins in 2015; cellulosic about 40 percent of EIA 2020 nationwide projection; no FFVs; E15 by 2016. • Early credits generated with corn ethanol; compliance is achieved every year up to 2020; • Surplus credits from early generation remain after 2020;
<p><i>Scenario 7: Complete shift with FFV future</i></p>	<ul style="list-style-type: none"> • Similar to Scenario 6, but with a small number of FFVs operating on E85 50 percent of the time; early surplus credits remain after 2020; E15 by 2016.

<i>Scenario 8: Complete shift, increased ethanol future</i>	<ul style="list-style-type: none"> • Large number of FFVs operating on E85 50 percent of the time; E15 by 2016. • Sugarcane and cellulosic ethanol introduced in 2015; drop-in fuel starts in 2016; • Cellulosic about 25 percent of EIA 2020 nation-wide projection; • Compliance is achieved every year between 2011 and 2020, and early surplus credits are generated as in Scenario 7, which remain after 2020; • Less drop-in fuel than Scenario 7, but large number of FFVs used so that projected E85 use is in line with CEC projections; sugarcane ethanol and cellulosic ethanol begin in 2014;
<i>Scenario 9: Complete shift with FFV future and E10</i>	<ul style="list-style-type: none"> • Similar to Scenario 7; but with the use of E10 instead of E15; and with greater number of FFVs.
<i>Scenario 10: Complete shift, increased ethanol future and E10</i>	<ul style="list-style-type: none"> • Similar to Scenario 8; but with the use of E10 instead of E15; and with greater amount of cellulosic ethanol.
<i>Scenario 11: Complete shift, less FFVs.</i>	<ul style="list-style-type: none"> • Similar to Scenario 8; but with E10 instead of E15; and fewer FFVs. • Same drop-ins as Scenario 6.

Table V-2. Summary of Updated 2011 Illustrative scenarios for Diesel

<i>Scenario 1: Soy biodiesel future</i>	<ul style="list-style-type: none"> • Diesel is blended with non-conventional diesel initially at four percent in 2012 up to 20 percent by 2017 and thereafter. • Soy biodiesel is the predominant biofuel used through 2018 with increased use of unused cooking oil thereafter. • Deficits generated early in the program can be offset with additional gasoline credits until blends reach the appropriate volumes to be self-sustaining in 2013. • Annual deficits generated between 2017 and 2020, but some credits remain after 2020.
<i>Scenario 2: Canola oil future</i>	<ul style="list-style-type: none"> • Similar assumptions to Scenario 1; • However, also includes canola oil, which displaces other biodiesel feedstocks.
<i>Scenario 3: Corn oil future</i>	<ul style="list-style-type: none"> • Similar assumptions to Scenario 2; • However; also includes small amounts of corn oil.
<i>Scenario 4: Diverse biodiesel future</i>	<ul style="list-style-type: none"> • Similar assumptions to Scenario 3; • However, also includes small amounts of tallow renewable diesel, further diversifying the mix of biodiesel types (i.e. soy, corn, canola and UCO) quantities.
<i>Scenario 5: Drop-in</i>	<ul style="list-style-type: none"> • Similar assumptions to Scenario 4; • However, also includes small amounts of drop-in renewable diesel in 2014

<i>renewable future</i>	<ul style="list-style-type: none"> with moderate increases through 2020. Introduction of renewable diesel significantly reduces amounts of soy biodiesel.
<i>Scenario 6: CNG future</i>	<ul style="list-style-type: none"> Similar assumptions to Scenario 5; However, includes the effect of adding 10,000 CNG heavy duty vehicles by 2020.

c. 2011 Illustrative Scenario Results

This section provides a summary of the results. The detailed results of the fourteen scenarios are provided within Appendix C. The results collectively represent outcomes that could result from the effects of various assumptions about future compliance options over the course of the LCFS compliance schedule. These assumptions covered a range of possible outcomes and were primarily formed by developing options that may be feasible in the time frames suggested and are complimentary.

The gasoline and diesel scenario results provide an illustration of how credits may be generated or deficits created given the assumptions inherent in each scenario. The scenarios consider: fuel and vehicle technologies (current and developing), the availability of low carbon blendstocks and fuels, and other factors. Each of the scenarios includes a mix of fuels that could potentially meet the LCFS targets. The results of the scenarios are presented as follows.

i. Gasoline Scenario Results

Table V-3 below summarizes the credits or deficits created annually under the various gasoline scenarios and the cumulative credit totals for the years 2011 to 2020. Please note that a regulated party's compliance in a given year is determined by their cumulative credits, as annual deficits may be reconciled with credits earned in a previous year. The annual and cumulative credits and deficits are expressed in thousand metric tons (1,000 MTs); a positive value represents a credit, while a negative value represents a deficit. Positive cumulative balances or neutral balances indicate scenarios that meet the target overall for a given year.

Table V-3. Summary of Gasoline Scenario Credits/Deficits

Scenario	Credits/Deficits (1000 MTs)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	Annual	556	714	550	410	131	827	-181	-599	-305	-267
	Cumulative	556	1,270	1,820	2,230	2,361	3,188	3,007	2,408	2,103	1,836
2	Annual	556	683	577	408	63	725	-118	-587	-171	-1,146
	Cumulative	556	1,239	1,816	2,224	2,287	3,012	2,894	2,307	2,136	990
3	Annual	556	572	184	39	-158	378	324	197	-523	-1,389
	Cumulative	556	1,128	1,312	1,351	1,193	1,571	1,895	2,092	1,569	180
4	Annual	556	661	406	117	-255	221	-13	-191	-315	-655
	Cumulative	556	1,217	1,623	1,740	1,485	1,706	1,693	1,502	1,187	532
5	Annual	556	572	184	6	-3	289	296	-96	-373	-892
	Cumulative	556	1,128	1,312	1,318	1,315	1,604	1,900	1,804	1,431	539
6	Annual	556	572	184	3	0	-3	4	3	1	5
	Cumulative	556	1,128	1,312	1,315	1,315	1,312	1,316	1,319	1,320	1,325
7	Annual	556	572	184	0	2	6	2	7	7	4
	Cumulative	556	1,128	1,312	1,312	1,314	1,320	1,322	1,329	1,336	1,340
8	Annual	556	572	184	4	7	5	2	1	-1	1
	Cumulative	556	1,128	1,312	1,316	1,323	1,328	1,330	1,331	1,330	1,331
9	Annual	556	572	184	0	1	-1	1	1	0	2
	Cumulative	556	1,128	1,312	1,312	1,313	1,312	1,313	1,314	1,314	1,316
10	Annual	556	572	184	4	4	7	1	-1	2	2
	Cumulative	556	1,128	1,312	1,316	1,320	1,327	1,328	1,327	1,329	1,331
11	Annual	556	572	184	0	1	2	0	3	3	0
	Cumulative	556	1,128	1,312	1,312	1,313	1,315	1,315	1,318	1,321	1,321

In general, all eleven gasoline scenarios show positive (green shading) substantial cumulative credit balances from 2011 through 2020. The credit balances indicate that meeting the targets through 2020 is plausible under these scenarios, despite some years having no credits (no shading) or having annual deficits (yellow shading) at various points.

There are a number of useful observations that can be made based on an evaluation of the scenarios. For scenarios 1 and 2, the early use of low CI ethanol creates substantial credits before 2017 that can be banked and used in later years to offset deficits in those years. Although there are deficits generated in the latter years, there are sufficient credits remaining from the accumulated bank after 2020. Further, these scenarios show that cellulosic ethanol, even if used in low but gradually increasing levels, can reduce the demand for corn ethanol.

For scenario 3, the delayed penetration of cellulosic ethanol can result in deficits generated in 2015, with credits generated from 2016 to 2018 as cellulosic ethanol begins to penetrate the market. Even with those deficits, the scenario shows sufficient credits can be accumulated so that a positive balance can remain after 2020.

For scenario 4, credits are accumulated at a lesser pace than with scenario 3 and annual deficits would be generated from 2018 to 2020. Nevertheless, the accumulated credits are sufficient to ensure that surplus credits remain after 2020. If corn ethanol volumes remain near current levels, increased use of E85 in FFVs would be needed. By contrast, scenario 5 shows that if drop-in gasoline becomes available by 2015, no FFVs using E85 would be necessary to meet the LCFS targets.

For scenarios 6, 7, and 8, note that annual compliance is achieved through 2020 by using surplus credits generated through 2013. A small annual surplus is generated nearly every year from 2014-2020.

Based on the above, staff believes the illustrative scenarios evaluated show a variety of pathways toward meeting the LCFS targets through 2020, even as the standards tighten in the latter years and it becomes more challenging for fuel providers to generate credits. As the LCFS program moves forward, staff will continue to monitor the factors built into the scenarios.

ii. Diesel Scenario Results

Table V-4 below summarizes the credits or deficits created annually under the various diesel scenarios and the cumulative credit totals for the years 2011 to 2020. As with the gasoline scenarios presented above, the annual and cumulative credits and deficits are expressed in thousand metric tons (1,000 MTs); a positive value represents a credit, while a negative value represents a deficit. Positive cumulative balances or neutral balances indicate scenarios that meet the target overall for a given year.

Table V-4. Summary of Diesel Scenario Credits/Deficits

Scenario	Credits/Deficits (1000 MTs)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	Annual	-105	-7	0	0	21	17	27	23	17	7
	Cumulative	-105	-112	-112	-112	-91	-74	-47	-24	-7	0
2	Annual	-105	-7	5	2	18	27	15	16	25	9
	Cumulative	-105	-112	-107	-105	-87	-60	-45	-29	-4	5
3	Annual	-105	-7	5	1	13	16	18	26	13	23
	Cumulative	-105	-112	-107	-106	-93	-77	-59	-33	-20	3
4	Annual	-105	-7	5	-2	16	15	19	21	15	27
	Cumulative	-105	-112	-107	-109	-93	-77	-59	-38	-23	4
5	Annual	-105	2	16	15	11	14	16	11	10	13
	Cumulative	-105	-103	-87	-72	-61	-47	-32	-21	-11	2
6	Annual	-105	3	9	10	12	13	15	14	17	14
	Cumulative	-105	-102	-93	-83	-72	-58	-43	-29	-12	2

At first glance, the scenarios evaluated by staff seem to show a different picture than that for the gasoline scenarios. These diesel scenarios conservatively assume a gradual increase in biodiesel use from B0 in 2011 to B20 by 2017. In general, these diesel scenarios suggest that, during the first two or three years of the LCFS program, annual deficits may be generated as biodiesel begins to be incorporated into the diesel pool. However, the scenarios may be misleading, as explained below.

The illustrative scenarios above notwithstanding, it is important to note that the diesel sector would not actually experience the ongoing cumulative deficits suggested by the diesel scenarios. The discrepancy arises because the regulation requires that deficits in one year be completely reconciled by the end of the following year. Therefore, to the extent cumulative deficits occur in 2011 deficits, the regulation requires those deficits to be completely reconciled by the end of the 2012. And because diesel regulated parties are generally the same fuel providers as the gasoline regulated parties, they will by necessity reconcile the 2011-2012 deficits by applying credits generated within their gasoline pools or credits purchased from other regulated parties. As the gasoline scenarios showed, there should be ample credits generated in the early years for that fuel sector.

Thus, in reality, all the scenarios above should start with no deficits or positive credit balances in 2013 and continue to accrue credits, both annually and cumulatively,

through 2020 as biodiesel and renewable diesel increase their penetration into the diesel fuel pool. Staff did not show this in the scenarios since the scenarios were intended to be standalone, but the reconciliation requirement in the LCFS would ensure that the diesel sector would accrue credits annually.

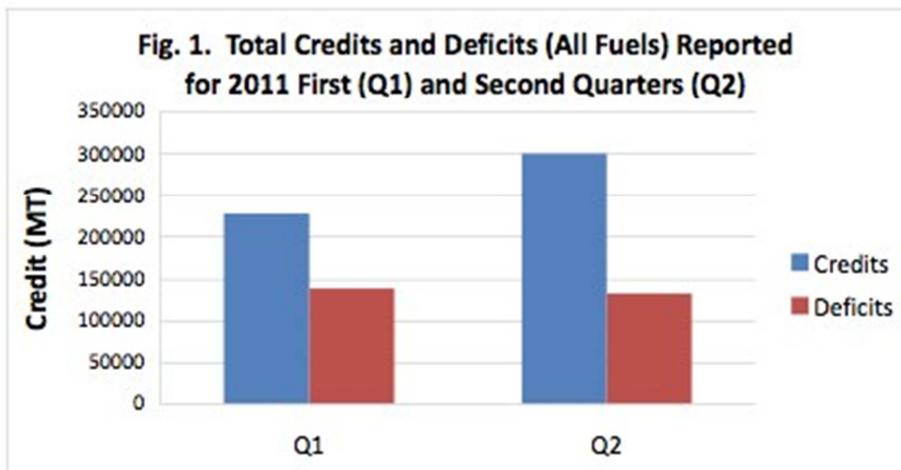
Given the above considerations, surplus credits should continue to accumulate up to and after 2020. It should be noted that, given the large difference in carbon intensities between various biodiesel feedstock sources (e.g., soy oil, used cooking oil, canola oil, corn oil and tallow renewable diesel), credit generation outcomes were highly sensitive to biodiesel feedstock choice. Further, the above scenarios are based on a gradual penetration of biodiesel and renewable diesel. To the extent the use of biodiesel and renewable diesel is accelerated in the early years, along with alternative-fueled heavy duty vehicles (e.g., CNG/LNG vehicles), the accumulation of credits shown in the scenarios may occur faster than indicated.¹

d. First and Second Quarter 2011 Credit/Deficits Generated

As the illustrative scenarios discussed above show, substantial credit generation in the early years can assist regulated parties in meeting the LCFS targets through 2020. The targets are borne out by data from the LCFS Reporting Tool (LRT). Figure 1 below shows staff's analysis of the LRT data for the first two quarters of 2011. The figure shows that regulated parties generated about 225,000 metric tons (MT) credits in the first quarter and about 300,000 MTs credits in the second quarter, a total of about of 525,000 MTs of fungible credits. The fungible credits compare favorably to the less than 300,000 MTs of deficits. In other words, the amount of "excess" credits (i.e., beyond those needed to offset the deficits) is about 225,000 MTs. To the extent that regulated parties bank these credits, the banked credits can provide substantial assistance to regulated parties in meeting the LCFS targets in the latter phase of the program.² The HCICO provisions dictate that credits may only be banked after reconciling the current year's deficit incurred by HCICO. Thus, the actual credits that can be applied to future years would be less than the 525,000 credits indicated.

¹ ARB staff recently issued a biodiesel regulatory guidance explaining ARB's plans for proposing motor vehicle fuel specifications for B6 and above in a late-2012 rulemaking and plans to conduct further research involving B5 over a five-year timeframe. See <http://www.arb.ca.gov/fuels/diesel/altdiesel/20111003BiodieselGuidance.pdf>. This guidance is intended to provide certainty to the biodiesel and diesel industry with regard to ARB's rulemaking plans and thereby accelerate the introduction of NOx-mitigated B20 into the diesel fuel pool.

² Regulated parties appear to be banking these credits in the absence of explicit provisions governing credit trading; staff is proposing explicit credit trading provisions in the upcoming December 2011 rulemaking to provide the "ground rules" for credit trading and other refinements to the LCFS regulation. See <http://www.arb.ca.gov/fuels/lcfs/regamend/regamend.htm>.



Source: LCFS Reporting Tool.

C. Strategies for and Challenges to Meeting the Targets

1. Strategies for Meeting the Targets

Several potential strategies to meet compliance targets include: accumulating initial credits, diversification of product slate, and investment in the commercialization of new **technology**-such as installation of alternative fuel infrastructure or alternative fuel production facilities.

As noted in the scenario results discussion, the generation of additional credits in early years, to allow for potential shortfalls as potential technical or market barriers are overcome, could be a reasonable approach to provide some safeguards towards future CI deficit years. With the inherent possibility that forecasted fuel projections may be higher or lower, regulated parties should consider taking early actions to ensure compliance with the required reductions.

Regulated parties may also be able to expand their market by producing alternative fuels as another strategy in their suite of approaches for meeting the compliance targets. As regulated parties determine how compliance will be achieved, the introduction of new technology, low CI fuels, and blendstocks in the market will provide for stable and effective compliance options. Use of these options may provide regulated parties with more flexibility in achieving compliance.

Interchangeable use of gasoline and diesel credits may also be used to achieve compliance. While there may be excess credits generated using gasoline fuels through

the use of ethanol blends, higher blends of non-conventional diesel may progress and become credit generators in the mid-term of the program.

To the extent possible, investment towards commercialization of new and advanced production and blending technology could pay dividends if technology advancement leads to efficient and more cost-effective means of fuels production and marketing.

2. Challenges to Meeting the Targets

As discussed above, staff, as well as some panelists, believes that the analysis above shows that near and mid-term targets are clearly achievable. This conclusion is supported by the substantial generation of credits to date and by illustrative scenarios done by both CEC and ARB staff, which show there are numerous scenarios in which these targets may be met, although CEC staff have expressed concern with the long term goals of the LCFS. With regard to the long-term targets, staff believes that it is too early in the program's implementation to identify with certainty the strategies regulated parties would likely use to meet those targets. Nonetheless, staff believe that the illustrative scenarios show that there are approaches and combinations of fuel technologies that can achieve the long-term targets. However, some panelists have presented their opinion that the targets are not feasible.

The LCFS is a "back-loaded" performance standard that is designed to require only modest CI reductions in the near and mid-term. The LCFS is designed this way to provide sufficient time and investments for advanced fuel technologies, many of which exist today in limited quantities, to become fully commercialized in time to meet the more stringent standards in the 2018-2020 timeframe. Some of the fuel technologies that may be used to meet the targets have some challenges to commercialization. Because the Panel was interested in discussing this topic, staff worked with panelists to identify some of these challenges.

A potential challenge to meeting the targets fully is if all fuels that are expected to help achieve compliance are in short supply for extended periods. For example, production volumes for lower-CI ethanol, biodiesel, and drop-in fuels may not be high enough to meet the targets. If the vehicle population increases, the shift to alternative fuels such as natural gas, electricity and hydrogen, substantially more credits could be generated than anticipated. Staff notes, however, that for the near and mid-term horizon, production capacity for lower-CI ethanol and biodiesel appears to be ample for meeting California's needs.

Another potential challenge would be the shortage of feedstocks needed for the production of low CI fuels. If substantial quantities of biofuel feedstocks are redirected towards food production for any reason, fuel use may need to be re-evaluated to determine if adjustments to the illustrative scenarios are needed. A full discussion of these challenges is beyond the scope of this chapter; Chapter V discusses more extensively these and other possible challenges for specific fuels.

If the costs of supplying the appropriate CI fuels to the vehicle population are higher than anticipated, people may defer to lower-cost options with higher CIs. A full discussion of economic challenges is beyond the scope of this chapter; Chapter VII discusses the economic challenges more extensively.

D. Potential Flexible Compliance Mechanisms

1. Staff's Perspective on the Need for Flexible Compliance Mechanisms

In addition to discussing challenges, some panelists were interested in discussing whether a flexible compliance mechanism was appropriate for inclusion in the regulation. It was suggested that ARB consider a flexible compliance mechanism for use in case a regulated party may not be able to meet the compliance target in a given compliance period despite its good faith efforts to do so. Staff agreed to take a closer look into such a mechanism as part of this review and make a preliminary determination if such an option has merit sufficient to warrant further investigation for possible inclusion within the LCFS program. Staff asked interested panelists to prepare a separate white paper to identify the elements of what the panelists believe are appropriate flexible compliance mechanisms. The main elements of the white paper are discussed later in this chapter.

As suggested, the concept is not intended as a substitute for the overall LCFS compliance schedules (i.e., so that regulated parties would have a choice between complying with the LCFS standards or the flexible compliance mechanism at any given time). Instead, the suggested concept of a flexible compliance mechanism would only come into play if specified adverse market conditions occur. The concept would provide a given regulated party a short-term alternative with which to comply assuming they can demonstrate compliance difficulties due to adverse market conditions. One such set of circumstances could occur if the credit market is short at some point in the program (e.g., if regulated parties hold onto their credits rather than trade them en masse); several panelists suggested a flexible compliance mechanism that might, for example, be set up to enable ARB to provide sufficient credits to the market to equalize such market perturbations.³

At this time, staff believes including a flexible compliance mechanism in the regulation is premature as it would require considerable evaluation and stakeholder dialogue. Also, based on data in the LRT, there are substantially more credits in the market currently than there are deficits. Staff's analysis of first quarter 2011 data shows that there are about 75,000 MT of CO₂e "net" credits (more credits than deficits generated) registered in the LRT. Further, staff's preliminary analysis of second quarter 2011 data suggests that the number of net credits has increased significantly relative to the first quarter.

³ One example suggested by panelist Bob Epstein (E2) and others, citing a recent example in the state of Hawaii, would involve the State of California receiving LCFS credits through a contract to supply the State's vehicular fleet with lower-CI fuels. A potential use of such credits would be for strategic easing of credit market fluctuations at pre-determined credit prices.

The increase of net credits is an indication that there are companies on track to meet or exceed their compliance obligations. However, staff is open to continue discussing the concept of a flexible compliance mechanism with stakeholders in an effort to determine if it might be an appropriate amendment at some point in the future.

While the existing LCFS regulation already allows credit trading between regulated parties, establishing the specific “ground rules” that govern trading in LCFS credits will help create a favorable market trading framework. In turn, the market trading framework would help make these credits more accessible for purchase by regulated parties who need such credits to meet their obligations. To this end, staff has developed specific credit trading provisions to be proposed for the Board’s consideration at its December 2011 hearing. Developed in consultation with stakeholders, the proposed credit trading provisions are intended to establish the ground rules for credit trading in the LCFS market and to help foster robust trading between regulated parties.

After the Board hearing in 2011, staff anticipates following up with stakeholders to further investigate the feasibility of developing the concept of a flexible compliance mechanism. As a preview to that follow-up, the next section presents a brief overview of the above-noted white paper on the concept of flexible compliance mechanisms.

2. Panelists’ Perspectives on the Need for Flexible Compliance Mechanisms

Predicting the market availability and rate of deployment of low carbon fuels is difficult at this early stage of the LCFS compliance schedule. As regulated parties consider economic tradeoffs, the market will begin its transition to lower CI fuels. As such, the market may experience temporary periods when demand for low carbon fuels exceeds supply. This imbalance may then lead to temporary shortfalls which may hamper the ability of regulated parties to comply with the LCFS targets. For example, regulated parties may not be able to procure either enough fuel or credits to comply based on factors outside that parties control such as supply disruption or possibly credit hoarding or other unforeseen events. Because of these shortfalls, flexible compliance mechanisms may need to be considered in order to maintain market stability and reduce the risk of high LCFS credit **prices**.

Developing fuel markets are inherently uncertain. Therefore, developing an FCM that can reduce the risk of high credit prices may increase market confidence and encourage investment. Many of the panelists have expressed support for flexible compliance mechanisms.

Ideally, any flexible compliance mechanism would be long-term, transparent and predictable. A flexible compliance mechanism addresses how the program will operate in the event that an obligated party fails to meet its obligation with market-sourced fuels or credits. A well-designed flexible compliance mechanism should:

- Be fair to parties that successfully comply with their obligation under the LCFS as well as to parties that temporarily cannot comply due to the limited availability of credits or low-carbon fuels.
- Ensure the stability of the LCFS program as the market expansion of available low-carbon fuels proceeds.
- Provide a clear, dependable signal to obligated parties and potential low-carbon fuel investors about how ARB would act in the event of a credit or supply shortfall so that parties can make efficient long-term investment decisions.

E. Summary and Conclusions

The LCFS is in the initial stage of implementation, and only limited data have been reported under the LCFS reporting tool. Nonetheless, the data that have been reported to date strongly suggest that regulated parties are able to meet the targets at this point. The reported data also indicate that almost twice as many credits are being generated than are being expended. The information presented in this chapter, including analysis of the illustrative scenario results, suggests that many viable paths exist to attain compliance with the carbon intensity standards through 2020. The actual fuel mix that regulated parties would use is difficult to predict. But, the scenarios show that various means exist to meet compliance.

Panel discussions around regulated parties and the targets of the LCFS were robust and included not only a discussion of what activity has been reported thus far, but the state of both new technologies and investments in those technologies. With the variety of panelists participating in the conversation, many different viewpoints were heard. Traditional fuel providers generally expressed belief that there were not enough low carbon fuels available to meet near-term goals, while biofuel providers generally expressed belief that there was opportunity to generate credits using fuels that are currently available, especially if the use of these fuels is expanded. There were also several panel members who provide fuels that are banking credits in the system.

Many panelists have suggested that ARB evaluate a flexible compliance mechanism for regulated parties in the event that they may not be able to meet the targets due to a potential temporary future shortage in credits or supply of complying fuels. In consideration of this suggestion, staff determined that including an flexible compliance mechanism in the program is not appropriate at this time, but merits further evaluation.

One of the goals for the upcoming December 2011 rulemaking is to help make credits more accessible in the marketplace. The upcoming proposed amendments would help establish a favorable market-trading framework that, in turn, should help make these credits more accessible for purchase by regulated parties who may need such credits to meet their obligations.