State of Oregon Department of Environmental Quality

Written Comments

March 2017, Clean Fuels Program 2017 Rulemaking Advisory Committee Meeting

Commenters

Charles Bonville

Oregon Environmental Council

Western States Petroleum Association

- Attachment: BCG Comments on Clean Fuels Program / 2017 Illustrative Compliance Scenarios, March 2017

To: Cory-Ann Wind, Bill Peters and the CFP 2017 Advisory Committee
From: Charles Bonville, prospective CFP Credit Generator, of Albany, Oregon
Subject: Comments regarding CFP Electricity Sub-workgroup Meeting of 2/24/2017

Dear Ms. Wind, Mr. Peters and the CFP 2017 Rulemaking Advisory Committee:

I am Charles Bonville, a prospective CFP Credit Generator in the Residential segment, residing in Albany, Oregon, with electric utility provided by Pacific Power and with on-site solar power generation. Below are my comments in regards to the Meeting Summary (https://www.oregon.gov/deq/Rulemaking%20Docs/CFPelectricity.pdf) of the Electricity Sub-workgroup Meeting that occurred on 2/24/2017.

Although I was not in attendance at the meeting, I have comments and suggestions to offer regarding the Summary of Input.

First, may I humbly express my sincere thanks to all of those in attendance. Your commitment to helping the CFP program be successful is admirable, and the diversity of companies and organizations at the table is testament to the importance of the work to be accomplished, and the potential of electricity-based CFP Credit generation to have meaningful impact on Oregon's transportation fuels market.

Second, my comments below are prefaced by a direct quotation of the comment or question as seen in the Meeting Summary document.

- *Use CFP to incent future EVs rather than existing EVs*

I contend that using the CFP revenues to incent future EVs to the exclusion of existing EVs will likely result in utility and/or government programs that are too focused on time-of-purchase incentives and EV marketing and awareness activities. I also suspect that this idea is being suggested as a way to avoid making the effort to directly measure energy consumption and credit generation in the residential market, and to then distribute CFP Credit revenues to the entities generating the credits.

Such focus on tomorrow's EVs misses the opportunity for the CFP to provide a long-term market incentive to continue using today's and yesterday's EVs, which will also incentivize new buyers for future EVs. For example:

1. The CFP should incent EV users for continuing to charge up their EVs. Continuing to generate CFP credits means that EV owners are always incentivized to charge their vehicles, and to continue behaviors that reduce transportation-related emissions of pollutants and greenhouse gases. As an example, there have been Chevrolet Volts and Plug-in Toyota Prius that are not plugged in routinely, or sometimes never, and thus not

benefiting the environment as much as the vehicles were expected to by the entities (mostly Federal and State government) that incentivized the purchases.

2. The CFP should incent EV users to charge up using low-carbon electricity. There is opportunity here for the CFP to drive demand for renewable energy, as low CI electricity enables more CFP credit generation per kWh. This demand for low CI energy can be generated throughout the program's lifetime. The CFP credit advantage can provide further economic incentive and market demand for distributed solar, community solar and other renewable energy products, all of which further supports the goals and principles behind Oregon's landmark legislation, Senate Bill 1547.
3. At a more future time, when hundreds of thousands of EVs are deployed, the CFP could provide incentives for EV users to charge up during off-peak demand. This would expand the reach of utilities' demand response programs, which further enhances grid stability and flattens the need for natural gas peaker plants, which can further de-carbonize the statewide average mix of electricity and may ultimately serve to hold electricity costs steady instead of climbing with inflation.[1]

- *Use smart meters to connect chargers with times that electricity is lower carbon.*
- *Use CFP to incent the use of smart chargers.*

Looking at the current technology options in EVSE, probably the best and most relevant example of an existing technology solution that meets both of these needs is a demand flexibility program in use in select areas of California and in conjunction with eMotorWerks smart-grid EVSE. eMotorWerks says it best:

Charge clean. Charge wise. Our Smart[Grid] charging solutions employ advanced algorithms and controls to make your EV charging greener and cheaper.

What's needed to implement this in Oregon is for PGE and PacifiCorp to assemble a "demand response program" for networked EVSEs, or to extend existing demand response programs to communicate to eMotorWerks' network of smart EVSE's, which can curtail demand according to utility-identified need. The eMotorWerks network can also distribute the demand response incentive revenue to participating customers, as well as provide electricity dispensation data for generating CFP credits, plus distribute CFP credit revenue to the customers.

[1] http://www.oregonlive.com/opinion/index.ssf/2016/01/electric_vehicles_will_lower_y.html, by Jeff Allen, of Drive Oregon, January 26, 2016.

All EV owners that already have EVSE can easily upgrade non-smart EVSE with the eMotorWerks JuicePlug, available for $199[2]. This cost is an investment that could pay for itself in CFP credit revenue in just months to a few years, depending on how much electricity is dispensed to the EV, the CI of the electricity and the pricing of the CFP credits. Adding in Demand Response revenue shortens the ROI time even further. Learn more at https://emotorwerks.com/rewards.

Secondary to this, I would encourage the utilities to use this same smart-grid EVSE network to provide a "super off-peak rate" to EV owners merely by rebating a few cents per kWH to charger owners that use their EVSE to charge their EVs during the lowest night-time demand on the grid. This can be done with potentially less program and administrative overhead than updating existing tariffs to include such rates (subject to PUC approval). Rather than using a traditional approach of specifying the off-peak hours are at certain times, days and seasons, the utilities can control when those hours occur based on real-time renewable energy supply surplus. Utilities can then avoid issuing a super off-peak period when weather-related spikes in demand, or curtailments in wind generation, result in no surplus energy on certain nights, thus ensuring that "super off-peak" consumption is only incentivized when energy conditions warrant, and minimizing economic risk to the utility. Thinking even farther forward to a highly solar-powered future, there may well be times in the Summer season that utilities would want to incentivize, or at least have the option to control, EV charging to occur near the solar noon, before the On-Peak demand begins later in the day.

This concept would be called "Surplus Response" (SR), and is the functional opposite of "Demand Response" (DR), but both serve to help balance generation and demand. One possible benefit to a well-subscribed, large SR program is to reduce, or otherwise delay to the future, the need for utilities to invest in grid-scale battery storage, instead leveraging distributed storage via connected EVs to absorb excess generation. Avoiding capital investments in generation and storage improves profitability and helps hold rates down for everyone, and this further improves the economic incentive of driving electric when compared to petroleum fuel costs.

A deeper dive into these concepts can be found online at UtilityDive.com in their feature article, *The new EV playbook: How utilities can gain from the coming boom in electric vehicles* which assesses how *Electric vehicles can offer grid services at bargain prices if charging is done when and where utilities need it*[3]. Below is a quote from the article:

> To make the EV resource available, stakeholder cooperation on advanced planning will be necessary in three broad areas: Siting and installing chargers, devising supportive subsidies and electricity tariffs,

[2] https://emotorwerks.com/store-juicebox-ev-charging-stations/1631-juiceplug-a-universal-smart-ev-charging-adapter

[3] http://www.utilitydive.com/news/the-new-ev-playbook-how-utilities-can-gain-from-the-coming-boom-in-electri/421559/

> and getting all the hardware and software support infrastructure in place.

If the CFP, PUC and utilities can move forward on the second two (subsidies/tariffs and hardware/software), the first will flow in response to the relatively low upfront investment needed for EV owners to participate in revenue streams from CFP credit generation and utility incentivized Demand Response and Surplus Response. The forthcoming deployment of Transportation Electrification by Pacific Power and Portland General Electric would, and should, integrate very well with these concepts.

To summarize, with another quote from the UtilityDive.com article:

> Through the use of properly-sited charging stations and rate design price signals, utilities can stimulate the adoption of electric transportation and utilize it to build a cleaner, more resilient grid, according to "Electric Vehicles as Distributed Energy Resources," a new report from the Rocky Mountain Institute (RMI)[4].

Similarly, I suggest that a properly designed CFP credit generation system for electric fuel will provide economic incentive price signals that stimulate the adoption of EVs and advance the rate of coincident reductions in transportation sector greenhouse gas emissions.

- *Direct-metered and smart-metered chargers provide better information for credit generation calculations than non-metered.*

In this era of the "Internet of Things," where widespread networking and distributed computing is ever-more common, it seems the Committee should strive to be as forward-looking and entrepreneurial as possible. The Committee should guide the CFP and stakeholders to engineer a CFP Residential Credit system that utilizes actual data, rather than making estimates from unmeasured EVs. The financial and logistical opportunities of a connected network of smart EVSE is a fabulous opportunity that should be embraced by government, industry and utility alike, and to do so now before there is the inertia of a status quo in place that works against the implementation of something better.

To be clear, I do not want to suggest that CFP, PUC and the utilities all have to be on-board today with rolling out a demand response system to smart EVSE in the process of solving direct-measure CFP credit generation. Rather, I am suggesting that CFP take the first step to pursue a solution to measure actual electric fuel dispensed in the residential market, and to embrace a solution that stands ready to roll-out Demand Response and Surplus Response

[4] http://www.rmi.org/Content/Files/RMI_Electric_Vehicles_as_DERs_Final_V2.pdf

capabilities when the utilities are ready to do so, because of how well the programs complement each other and work towards similar goals.

To summarize, and to cite prior ideas from other 2017 Rulemaking Committee materials, the Committee has a diverse selection of potential solutions for how to implement measurable residential EVs energy use instead of making educated estimations.

1. Utilize auto manufacturer on-board telematics systems.
2. Utilize existing networked EVSE operated by ChargePoint, CarCharging Group, AeroVironment, Tesla, eMotorWerks and perhaps others.
3. Utilize smart-grid capable networked EVSE such as JuiceBox Green and JuiceNet, both currently available through eMotorWerks.

Option 3 feels like the best option towards building a CFP electricity credit program that supports interoperability with an intelligent electric utility grid that is resilient, economical and powerfully responsive to all customers.

Equally important is the fact that all three of these ideas stand in stark contrast to where the CFP seems to be going right now for the Residential segment:

> *DEQ will develop the methodology (a way to estimate the number of EVs in a territory, the amount of electricity used and the carbon intensity of the electricity) to determine how many credits a utility can generate. The utility will then have the option to manage its credits itself or designate a credit aggregator to act on their behalf.*

I strongly urge the CFP, the PUC and this Rulemaking Committee not to let this estimation methodology come to pass. Better solutions already exist and we need only to set ourselves on that path.

Oregon has already defined itself as a leader in actions that create our clean energy future. Integrating CFP credits with utility DR and SR is our next great opportunity to be an example of innovation and leadership, and I do believe this can be accomplished without further acts of law from Oregon's legislature. With reasonable confidence, I say to this audience that the CFP and PUC already have the tools and legislative mandates they need to implement a program as described. The next step is to agree not to settle for a mediocre solution, and to grab the opportunity to continue leading Oregon forward.

Thank you for your time and consideration of these comments.

Sincerely,

Charles Bonville

Oregon Environmental Council
It's Your Oregon

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Founded in 1968, the Oregon Environmental Council (OEC) is a nonprofit, nonpartisan, membership-based organization. We advance innovative, collaborative and equitable solutions to Oregon's environmental challenges for today and future generations.

Ms. Cory-Ann Wind
Oregon Department of Environmental Quality
700 NE Multnomah St #600,
Portland, OR 97232

Re: Oregon Clean Fuels Program 2017 Rule Making

Dear Cory-Ann:

Thank you for the opportunity to provide comments on items from the Mar. 3 Advisory Committee meeting. The Oregon Clean Fuels Program has gotten off to a good start and we appreciate the agency's efforts to strengthen the program. We commend DEQ staff for adding additional guidance materials for the program as well.

2017 Illustrative Compliance Scenarios Draft Report

We appreciate the updated compliance scenarios that ICF is undertaking. In general, the update is on the right track. We would note that assuming plug-in electric vehicles will remain in the PHEV10 - PHEV40 range through 2025 is conservative. PHEV10 models are quickly being replaced by vehicles that have more all-electric miles. For example, the Volt is already being offered today with a 50 miles per charge range. We appreciate that ICF used a conservative assumption for transit bus electrification—half of what ODOT is planning for through 2025. That assumption may need to be revisited for future analysis.

We support the Clean Fuels Program taking a comprehensive look at the transportation system, including fixed guide way, transit buses and forklifts. We support the methodology of using different credit generation calculations for the pre- and post-baseline for the "additional electricity" technologies. We also appreciate the addition of Scenario 3, which does not "solve for zero" in the model. It's addition creates broader insights for how the program could evolve over time.

Given the potential for federal rollbacks of climate-beneficial programs like fuel economy standards, we would like to see the full greenhouse gas reductions summarized

in a new table. It is becoming increasingly clear that state and regional action is the driver for reductions in climate pollution. The accounting for greenhouse gas savings from electricity use should be fully accounted for in this program.

Rule Improvements

DEQ should be commended for proposing continuous improvements to the structure and administration of the Clean Fuels Program. We support the following:

- Re-categorizing Renewable Hydrocarbon Diesel from an opt-in to a regulated fuel.
- A default CI for imported B20.
- Removing the definition of "broker" and replacing with "credit aggregator". We support the goal of preventing market speculation while facilitating credit transactions. If credit aggregators are acting on behalf of regulated or opt-in parties, we do not see a problem with them directly holding credits if it enhances the ability to aggregate or transfer credits. We do not believe there should be artificial time limits placed on when credit aggregators must liquidate their credits.

Cost Containment

We previously submitted comments on WSPA's "short-term" cost containment proposal. We strongly oppose any provisions that undercut the clean fuels market and environmental and health benefits. These include automatic freezes, rollbacks or provisions—like to month-to-month credit price comparisons—that can easily be gamed. Because this program is designed for the public good, any revision of the standard must go through a public process. As designed, the program must also allow for market signals that incent clean fuels production and use in Oregon.

Adding a credit clearance market (CCM) with a known clearance price would be a substantial new addition to the program. Combined with the existing cost containment features in the program (e.g., banking, trading between pools, and fuel forecasting), a CCM rightly addresses credit, rather than fuel, prices. It creates options for regulated parties to obtain credits while maintaining the price flexibility that the oil industry indicated it wanted. We were compelled by the information presented that a higher clearance price, such as $300, early in the program could be accommodated while still providing substantial protection for consumers. A tiered approach signals Oregon is open for business early in the program, while aligning with other regional programs in the mid-term.

Accountability

We support DEQ's proposal to add "buyer beware" language and to strengthen DEQ's actions in the case of fraudulent credits, such as suspending the account of an entity that provides fraudulent credits. A hierarchy for accountability is also important. DEQ

should first hold the supplier of fraudulent credits accountable. But because lost emissions reductions undermine the environmental benefits of the program, buyers should be the second point of accountability if the fraudulent supplier is no longer in business. We also support the idea of an "insurance pool" that helps mitigate risk for any one regulated party.

Point of Obligation

We support Oregon Fuels Association proposal to establish in rule that obligations cannot be passed below the rack or terminal. This change maintains that fuel importers above 500,000 gallons are still responsible for deficits, but will not have to take on additional deficits for fuel purchased in state.

Electricity Working Group

We greatly appreciate the work group on the Electricity sector that was held. It is important that there is a clear pathway for residential EV credits to enter the program. We support using those credits to further the end-goals of the clean fuels program. Transportation electrification not only reduces climate pollution, but also cuts toxic air pollution. Vehicle pollution emits carcinogens, neurotoxins, and particulate matter that harm brain development and heart and lung function. Reducing the health burden from the transportation sector is a major co-benefit of the Clean Fuels Program.

Sincerely,

Jana Gastellum
Program Director, Climate
Oregon Environmental Council

Western States Petroleum Association
Credible Solutions • Responsive Service • Since 1907

Jessica Spiegel
NW Region

March 31, 2017

Via email at: OregonCleanFuels@deq.state.or.us

Ms. Cory-Ann Wind
Oregon Department of Environmental Quality
Clean Fuels Program
811 SW Sixth Ave
Portland, OR 97204

Re: WSPA Comments on the Oregon Clean Fuels Program

Dear Ms. Wind:

The Western States Petroleum Association (WSPA) appreciates the opportunity to provide the Oregon Department of Environmental Quality (DEQ) comments on the ICF Illustrative Scenarios. Our member companies are key stakeholders in the Oregon Clean Fuels Program (CFP). WSPA is a non-profit trade association that represents companies that account for the bulk of petroleum exploration, production, refining, transportation and marketing in the five western states, including Oregon.

General

WSPA has provided feedback on the ICF analysis in several letters over the course of the advisory committee effort, including the letters dated 02-08-2017 and 01-20-2017. Please review this material, as the concerns remain relevant.

BCG reviewed the ICF 2017 Illustrative Scenarios and provided new analysis, *Comments on Clean Fuels Program/ 2017 Illustrative Compliance Scenarios, March 2017*, attached. As BCG highlights, (pg 1) while the scenarios show how compliance would be theoretically possible, they do not demonstrate feasibility. Therefore the scenarios don't act as an adequate planning tool for the ODEQ, regulated parties, or credit generators.

For example, there are few details regarding the assumed technology advances, infrastructure requirements, or legislative changes needed to enable scenarios. There are no volume ranges by fuel type to inform expected timing of fuel availability. Instead, certain volume assumptions are escalated (up to a ceiling) until credits equal deficits through 2025. Therefore, it doesn't help estimate the feasibility of the Clean Fuels Program.

Scenario 3 is meant to demonstrate that a 10% reduction can be sustained, but it is subject to the same weaknesses as the first two scenarios, only multiplied by making aggressive assumptions about both volumes of biofuel blending and fleet conversion to alternative vehicles.

Actual 2016 credit and deficit data indicates the program is already falling short of the projected credit accrual. According to the ICF's 2017 Illustrative Compliance Scenarios (Scenario 1), 350,000 credits are banked in 2016 while the annualized 2016 data results in ~191,000 credits or 55% of the projected accrued volume. Scenario 1 is the basis for comparison because it reflects the least aggressive consumption of lower carbon intensive renewable fuels. The graph on page 5 of the BCG work highlights this.

Part of the selected methodology for ICF was this use of the "illustrative" concept. Forecasting *requires a feasibility assessment*, and the proposed methodology falls short of accomplishing this requirement. In addition, the feasibility of the clean fuels program relies heavily on banked credits that will be drawn down sooner than expected, based on the BCG analysis. As a result, program sustainability is not being forecasted by the ICF documents; and the actual program is projected to fail.

We therefore re-iterate that reliable cost containment measures will be critical to protect the consumer in the future, as the credit market gets tighter in an infeasible program.

Long Term Structural feasibility

The Oregon CFP has a long term structural feasibility problem. The current largest source of credits, ethanol, is limited to just over 10% of the gasoline pool because higher blends invalidate the auto manufacturers' warranties. (This is confirmed by the ICF assumptions.) Any growth in credits generated here can only be achieved by lowering the CI of ethanol blended. In fact, an ethanol CI less than negative 60 g/MJ is needed to meet a 10% CI reduction at this blend ratio. Therefore, long term compliance in the gasoline pool is clearly infeasible.

This shortfall could theoretically be made up with alternate fuel vehicles powered by electricity and CNG or LNG (using natural gas or biogas), but the amount of time required for vehicle fleet turnover is an enormous obstacle. If tomorrow and from now on 5% of the new vehicle fleet sold in Oregon were alternate-fuel capable and the EV/CNG/LNG fueling infrastructure was installed, it would still take more than 15 years for the fleet as a whole to reach 5% alternative vehicles. This is clearly far too little, and too late, to meet CFP requirements.

The only feasible way to make up the shortfall in the gasoline pool is over-compliance in the diesel pool, which will require use of much more biodiesel and renewable diesel. This poses potential regulatory, logistical, and vehicle constraints. For instance, while most truck manufacturers' warranties support B20 for model years 2011 and newer, not all do. Regardless, while addressing these potential constraints may enable use of B20, much more biodiesel and renewable diesel volumes will be needed. Availability of these renewable diesel volumes is questionable, as noted in the BCG analysis. Therefore, sustainable compliance with the CFP as it stands is unlikely.

ICF 2017 Analysis Calculation Review

WSPA believes there is another shortcoming of the ICF 2017 illustrative compliance scenarios. Upon review it appears that they did not account properly for blended fuels coming into the state. It is our understanding that ICF looked first at the total blended gasoline and blended diesel consumption in the state, then broke the total down into the neat fuel and the biofuel, and finally proceeded with their calculations. We think this understates the deficits as follows (example calculation for diesel):

Based on our understanding of how the ICF calculations were completed:

- 1MM gallons of a 5% biodiesel blend consumed in the state would come from 950,000 gallons of petroleum diesel, which would yield 278 MTs deficits in 2016.
- 50,000 gallons of biodiesel would breakdown by the ICF assumed ratios into 5682 gallons from soy, 38,636 gallons from canola, and 5682 from waste oil.
- The estimated combined CI of this biodiesel would be around 53.5 g/MJ. Combined credits would be somewhere around 274 MTs. This would yield a net of 4 deficits for the blend.

Using DEQs blended CI value, which would be applied if this volume of blended fuel was imported, 1 million gallons of the blend would yield 32 deficits instead of the 4 deficits that the ICF calculation method yields. ICF should utilize data from DEQ or other state agencies to determine the volume that is imported as a blend, and correct the calculation accordingly.

Questions regarding the updated 2014 Scenarios (for 2017)

- Page 16: What do the figures in this table represent? A number of forklifts? How many forklifts are actually being sold in Oregon? Do we really expect the sales of forklifts to grow 44% in 10 years?
- Page 19: Where is the Renewable Natural Gas coming from? Are there complementary state policies encouraging the growth of these fuels?
- Page 20: Where is the renewable diesel expected to come from?
- Page 22: How is distribution of the diesel fuel blended with more than 5% biodiesel and/or renewable diesel handled with the FTC labeling requirement?
- Page 22: Where is the biogas coming from to produce renewable natural gas?
  What is the plan for the Clean Fuel Program after all the banked credits are “consumed”?
- Scenario 3: What assumption is being used for E85 consumption, given that OEMs are stopping making FFVs, now that the CAFE credit incentive for doing so has been phased out? What EtOH content is being used in the E85 assumptions?

Thank you for your consideration of WSPA's comments. We welcome any questions or comments you might have.

Sincerely,

Attachment: BCG *Comments on Clean Fuels Program/ 2017 Illustrative Compliance Scenarios, March 2017*

cc: Tom Umenhofer, WSPA

Comments on Clean Fuels Program / 2017 Illustrative Compliance Scenarios

March 2017

THE BOSTON CONSULTING GROUP

New illustrative compliance scenarios released, but Clean Fuels Program still does not have a realistic planning tool

In February/March 2017, ICF presented illustrative compliance scenarios to represent potential Clean Fuels Program compliance from 2016-2025.

Two of the scenarios (Scenarios 1 and 2) are similar to those presented in 2014. Scenario 3 uses a combination of the first two to exceed minimal compliance.

Credits generated in the 2017 illustrative compliance scenarios are similar to those in the revised 2014 compliance scenarios, with the exception of additional electricity credits from sources such as fixed guideway, forklift and electric buses.

While the scenarios accomplish their goal of showing how compliance would be theoretically possible, they do not demonstrate feasibility. Therefore, they are not adequate as a planning tool for the ODEQ, regulated parties, or credit generators.

- There are few details provided regarding assumed technology advances, infrastructure requirements, or legislative changes needed to enable scenarios.
- There are no volume ranges by fuel type to inform expected timing of fuel availability. Instead, certain volume assumptions are escalated (up to a ceiling) until credits=deficits through 2025. Therefore, it doesn't help estimate the feasibility of the Clean Fuels Program.
- Scenario 3 is meant to demonstrate that a 10% reduction can be sustained, but it is subject to the same weaknesses as the first two scenarios, only multiplied by making optimistic assumptions about both volumes of biofuel blending and alternative vehicles.

Oregon Clean Fuels Program still infeasible

During infancy, low reduction levels give appearance of feasibility; but program unsustainable

1. **Based on ODEQ's third quarterly data summary (through 3Q 2016), ethanol and biodiesel blending accounts for 99% of credits generated in OR Clean Fuels Program to date.**
   - Alternative and drop-in fuels are lagging behind expectations from both 2014 and 2017 compliance scenarios

2. **The 2017 compliance scenarios anticipate significant banking of credits through 2021 to make up for likely deficits in the following years.**
   - Unless growth in alternative or drop-in fuels exceeds those suggested in compliance scenarios, shortfalls in banking in early years would mean a shortage of credits generated by 2025

3. **While currently the primary source of credits, most E10 and B5 blends are expected to be non-compliant[1] by 2018.**
   - Some of the alternatives shown as compliant on paper (including sugarcane ethanol and higher blends of biodiesel) are unlikely to be available to Oregon in the near-term

4. **Drop-in (renewable diesel) and alternative fuels (electricity and natural gas) have fallen short of expectations and face various challenges:**
   - Renewable diesel capacity in the US has been delayed and most imported renewable diesel will likely supply California.
   - Alternative fuels such as natural gas and electricity depend on adoption and availability of vehicles and refueling infrastructure will continue to be slow to materialize.

1. Generating more deficits than credits

Ethanol and biodiesel blending accounts for 99% of credits

For the program to work, other alternative fuels must ramp up quickly

To date the program has generated 574,157 credits.

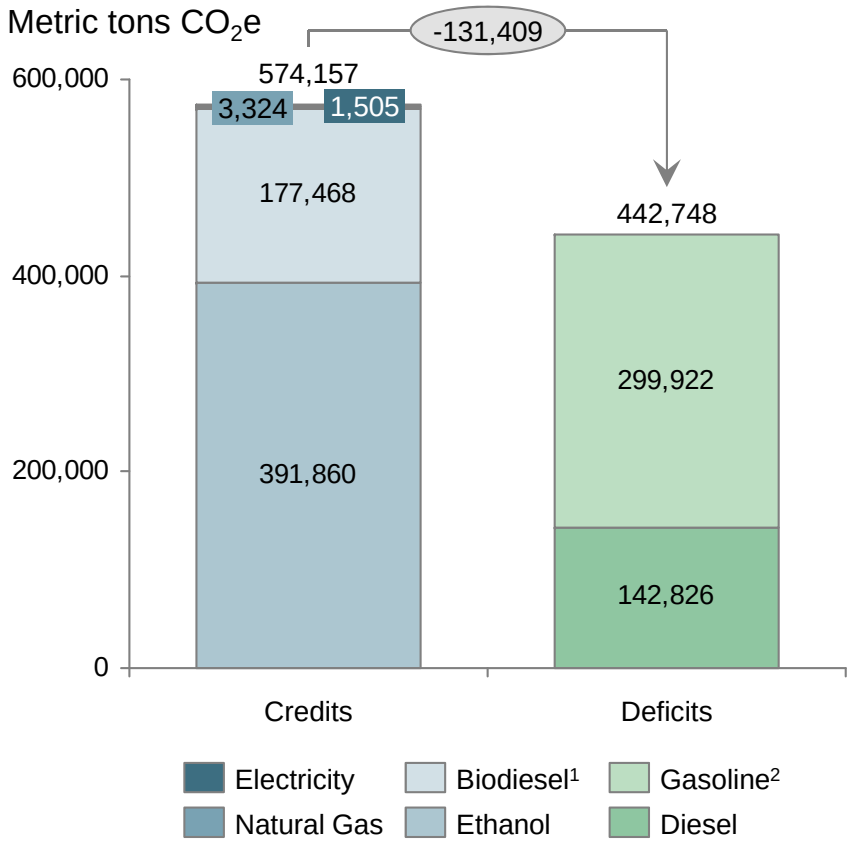
- 99% of these credits (569,328) are from the commercially available alternative fuels.

This exceeds the 442,748 of deficits generated from gasoline and diesel blendstocks, creating a "bank" of 131,409 credits to date.

To date there has been very little credit generation (<1%) from the other alternative fuels.

- Compliance scenarios expect a higher contribution to the bank of credits from these fuels starting in 2016.

Clean Fuels Program Credits and Deficits through Q3 2016



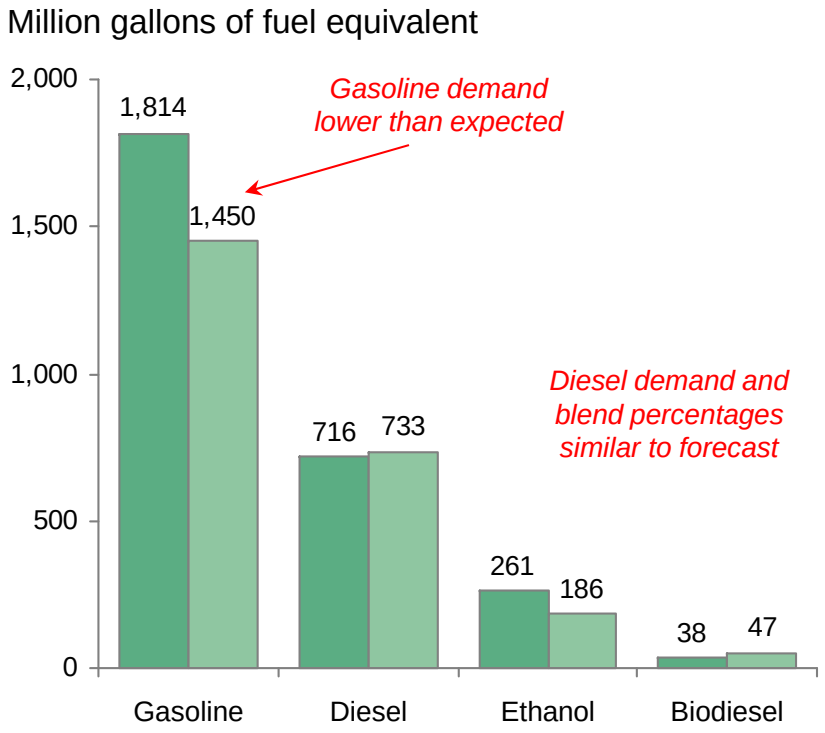
Note: Shows net balance for products that have generated both deficits and credits (ethanol, gasoline, diesel, biodiesel). LPG not shown (approx. 0.01% of credits)
1. Includes imported finished B5. 2. Includes imported finished E10

Source: ODEQ, ICF, BCG analysis

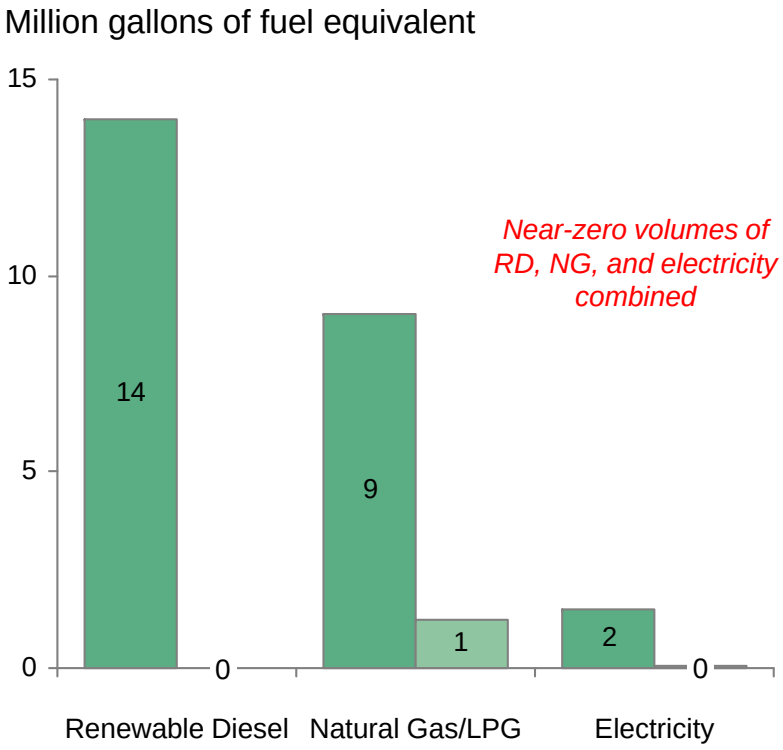
1

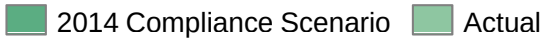
Through 2016, volumes of drop-in and alternative fuels are already falling significantly short of expectations

Ethanol and biodiesel blended fuels mostly in line with expectations



However, "non traditional" blends have fallen short



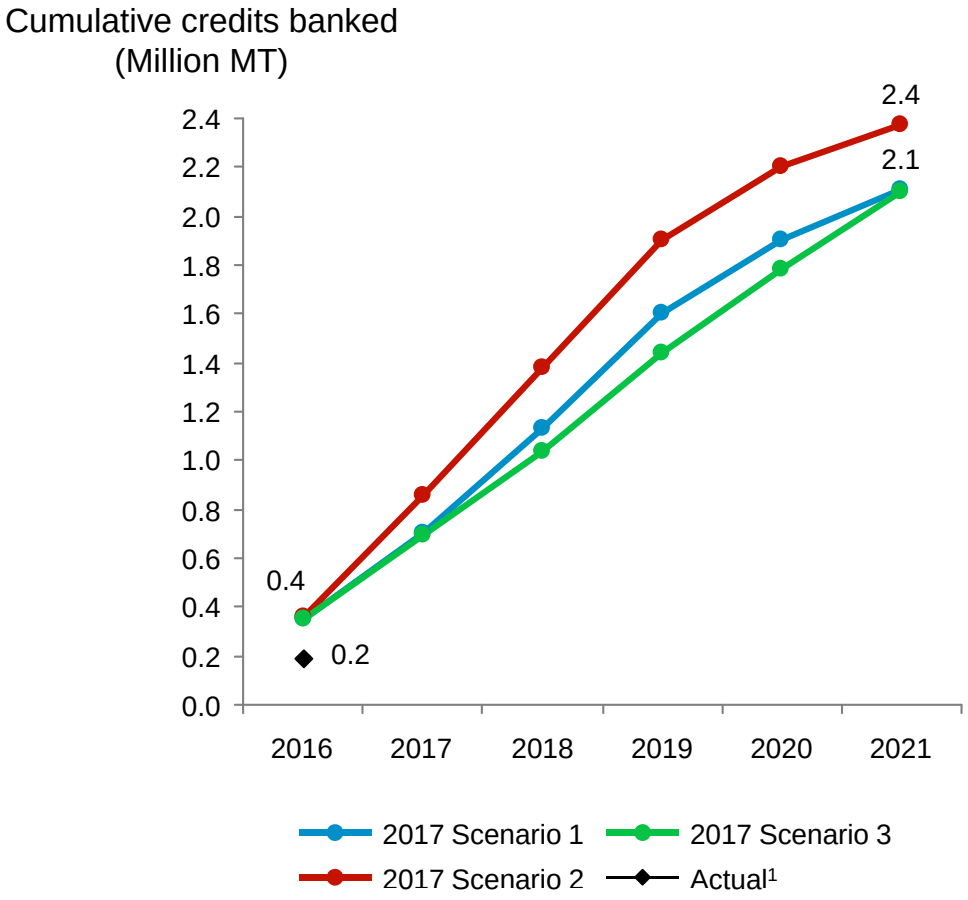


Note: Assumed Q4 2016 would be the same as the average of Q1-Q3.
Source: ICF 2014 compliance scenarios

Scenarios anticipate banking of 2 MM credits by 2021

However, bank build depends on rapid alternative fuel adoption

Compliance scenarios assume a rapid increase in credit bank through 2021



Banked credits important for compliance

Because the credits = deficits in 2025 for Scenarios 1 and 2, the program needs to achieve the expected credit bank during these early years.

- Falling short of these credit balances in these early years would mean that credit-generating fuels would need to grow even faster than expected in the already optimistic compliance scenarios.

In the 2017 compliance scenarios, the Clean Fuels Program reaches the peak banked credits in 2021 or 2022.

- Starting in 2017-18 credits will need to be generated from more than just ethanol and biodiesel to be able to consistently exceed the deficits.
- Based on credits generated to date and currently available fuels in the market, this seems unlikely.

1. Assumed 2016 Q4 would bank credits equal to Q3 (highest net credit quarter thus far)
Source: ICF February 2017 Item B, ODEQ, BCG analysis

3

Gasoline blend compliance is questionable, even in early years of the program

Example:
- *In 2018, standard CI is 97.63*
- *Clear gasoline is 100.77*
- *A blend of 90% clear gasoline and 10% ethanol would require an ethanol CI of **57.38** to be credit neutral (same number of deficits and credits)*

In 2018, only NW Corn and Sugarcane ethanol would have CIs low enough to make blended gasoline without generating net deficits.
- Both of these blendstocks are expected to be limited in availability.

Starting in 2019, all ethanol blends would be expected to generate deficits.

		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
		Required EtOH CI for blend to be compliant									
Blendstock CI[1]		67.61	64.29	57.38	50.61	36.93	23.39	2.94	(17.51)	(37.96)	(65.19)
MW Corn	69.89										
NW Corn	53.81										
Sugarcane	51.04										
Low CI Corn	57.58										

1. CIs taken from March 2017 ICF presentation
Note: Baseline value for gasoline is E10 with 90% clear gasoline and 10% corn ethanol based on the weighted average of corn ethanol supplied to Oregon in 2013
Source: ICF, BCG analysis

Compliance scenario ethanol blends will generate more deficits than credits starting in 2019

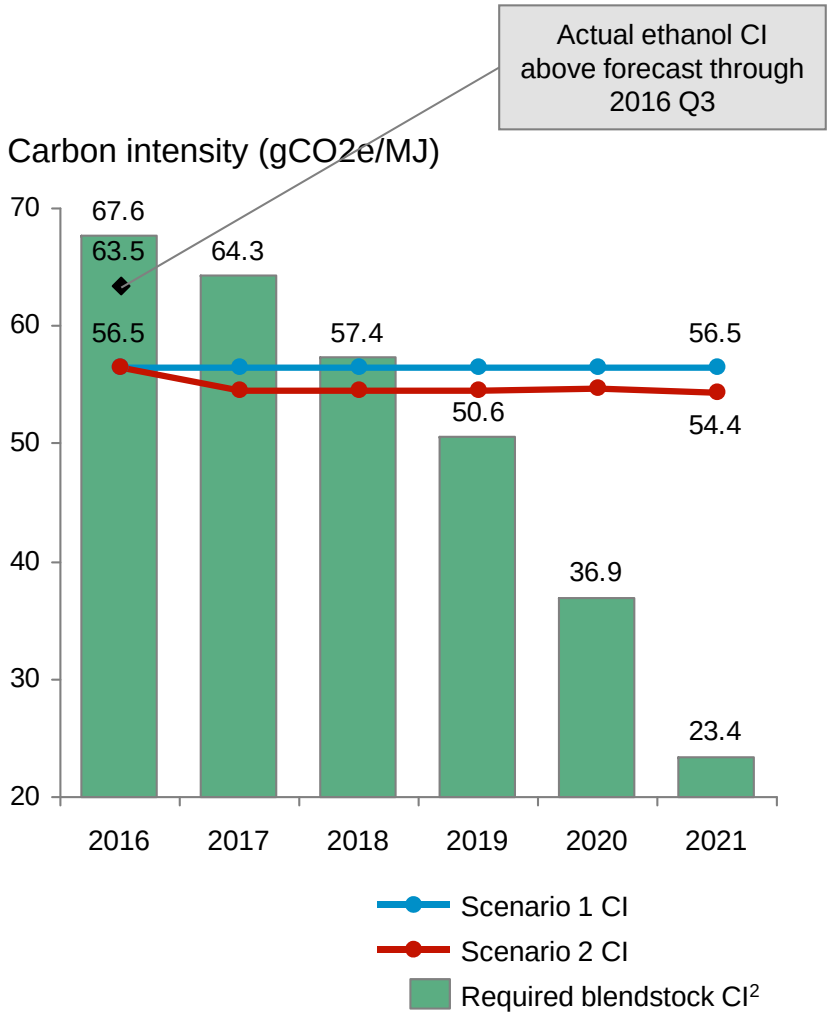
The CI requirement for gasoline blends decreases every year, but the CI of the gasoline blendstock stays constant.

- Therefore, each year the required CI for ethanol blendstocks decreases

Based on the volumes in the 2017 compliance scenarios, the CI of ethanol blendstocks will be around 54-56.

- Starting in 2019, this average CI will not be low enough and ethanol blends as a category will generate deficits.
- In 2016 the compliance scenarios show an average CI of 56.5 but based on volumes from ODEQ reports, the average CI is 63.5[1].

Decreasing credits from ethanol blends at this critical stage of building up a credit bank for compliance is risk for the long-term viability of the program.

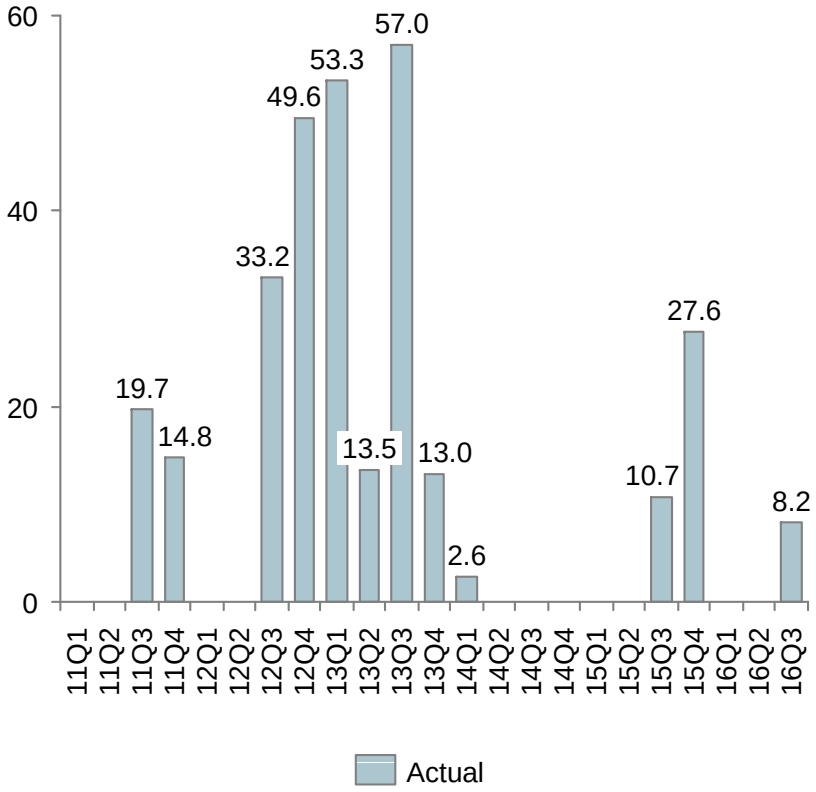


1. Using the default CI for each ethanol grouping 2. Required blendstock CI to make gasoline blend compliant
Source: ODEQ, ICF Item B, BCG analysis

ICF illustrative scenario assumes a ramp-up and a steady supply of sugarcane ethanol[1]

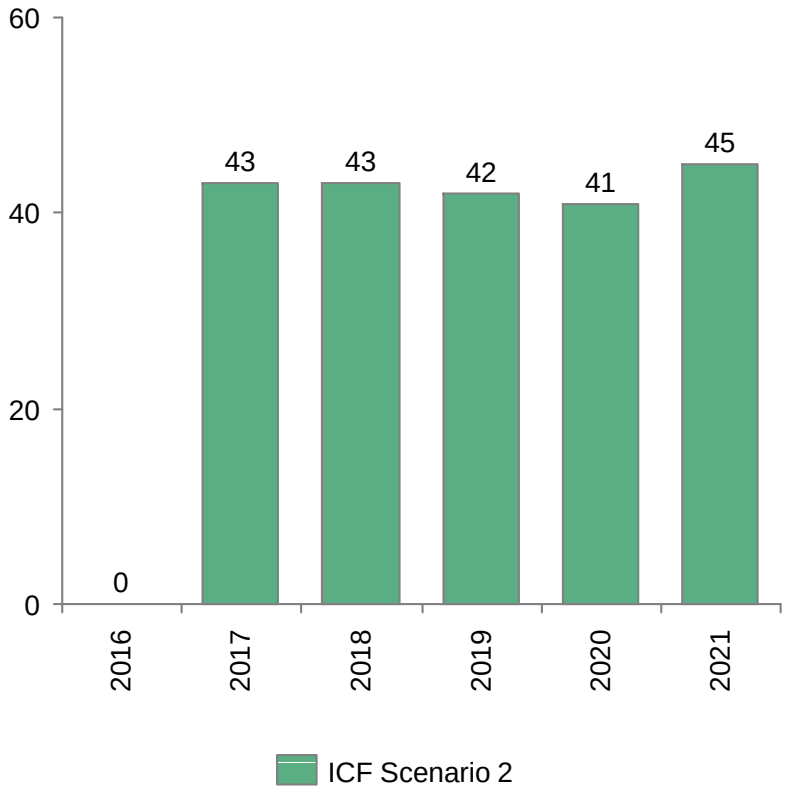
Even with LCFS fully active, CA is not pulling a steady supply[2]

Cane ethanol from Brazil to CA (Million gal)



What change would result in sudden sugarcane ethanol imports?

Cane ethanol projected for use in Oregon (Million gal)



1. Scenario 2 2. Recently sugarcane ethanol in Brazil has been increasingly consumed locally as E100. Consumers have switched from gasoline to ethanol as fuel as it is cost competitive with gasoline in Brazil.
Source: CARB quarterly LCFS data (as published January 2017), ICF February 2017 Item B, BCG analysis

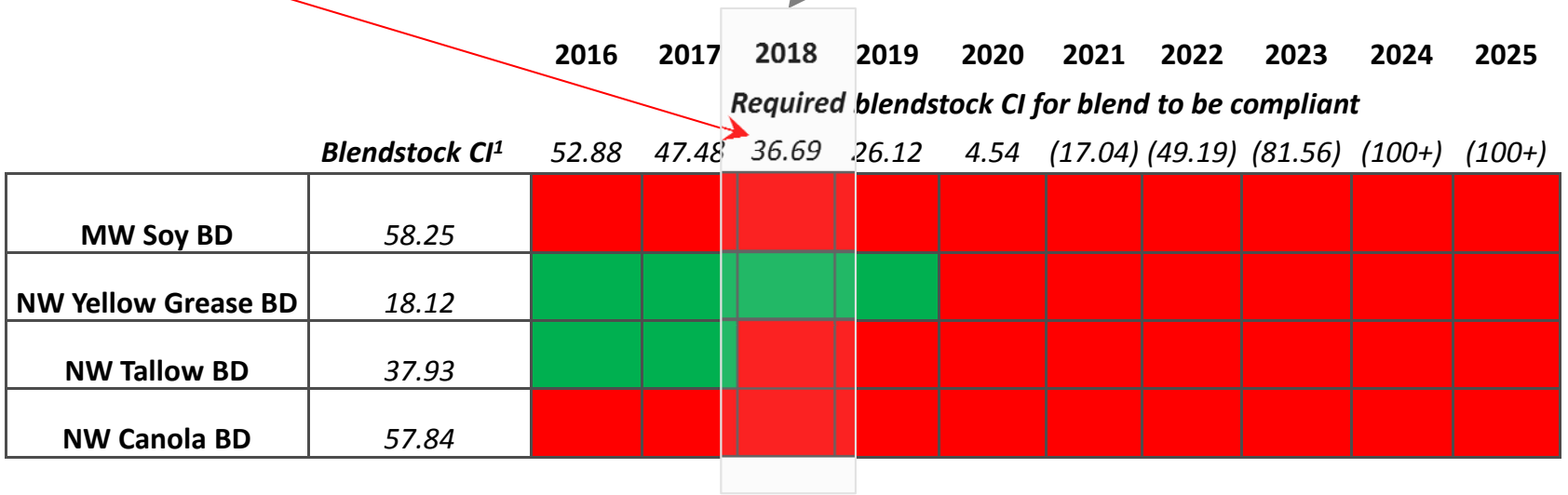
3

Similar to gasoline blends, most 5% blends of biodiesel are expected to be non-compliant by 2018

Example:
- *In 2018, standard CI is 98.64*
- *ULSD is 101.65*
- *A blend of 95% ULSD and 5% BD or RD would require a BD/RD CI of **36.69** to be credit neutral (same number of deficits and credits)*

In 2018, only NW Yellow Grease BD would have CIs low enough to make ULSD without generating net deficits.
- Waste oil BD volumes expected to be limited

Starting in 2020, all diesel blends would be expected to generate deficits.



1. CIs taken from the March 2017 ICF presentation with the exception of Tallow RD which was taken from Oregon Carbon Intensity Lookup Table for Diesel and Diesel Substitutes
Note: Baseline value for gasoline is B5 with 95% clear diesel and 5% soybean diesel
Source: ICF,ODEQ, BCG analysis

Compliance scenario biodiesel blends could generate more deficits than credits as early as 2017

As with gasoline, the CI requirement for blended diesel decreases every year, but the CI of the hydrocarbon diesel stays constant.

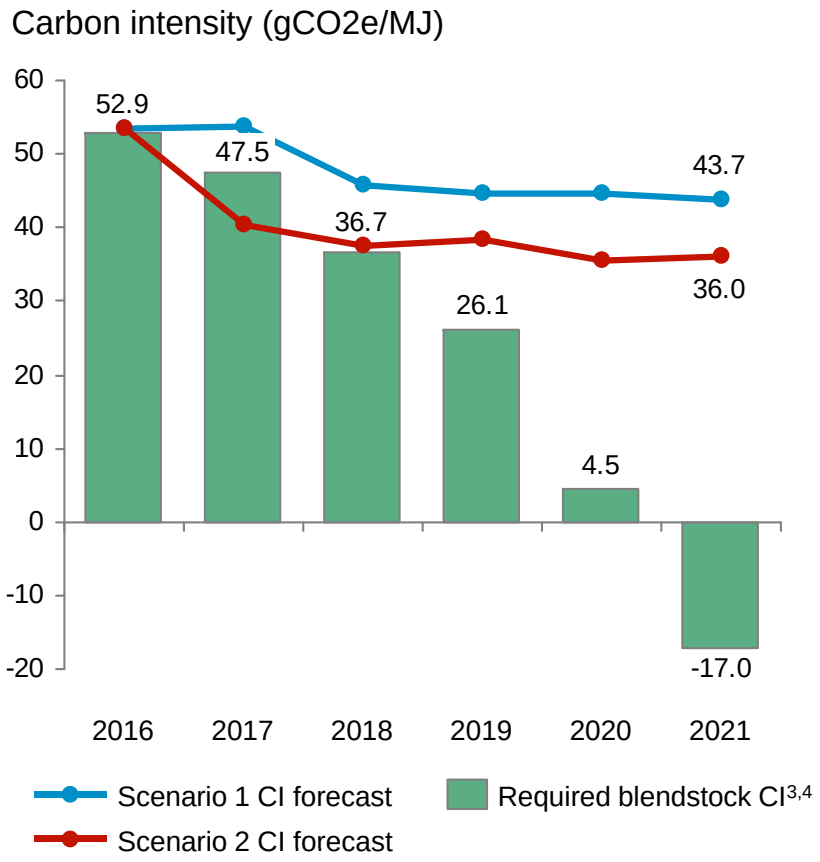
- Therefore, each year the required CI for biodiesel blendstocks decreases for the blended fuel to be compliant[1] .

Based on the volumes in the 2017 compliance scenarios, the average CI of biodiesel blendstocks ranges from 36-48[2] depending on the scenario.

- Starting in 2018, the average CI would not be low enough and biodiesel blends as a category will generate deficits.

With the potential for biodiesel to generate deficits at this early stage of the program, the long-term viability is fragile.

- ICF assumes that biodiesel blends would increase to 10% but labeling requirements will make the transition above 5% challenging to fuel suppliers.



1. Generate as many or more credits than deficits 2. Using the default CI for each biodiesel grouping 3. Required blendstock CI to make ULSD blend compliant 4. Does not include the impact of increasing blend to greater than 5%
Source: ODEQ, ICF Item B, BCG analysis

Renewable diesel not currently generating credits

Qualifying renewable diesel volumes in Oregon, thus far unseen, are unlikely to reach forecasted levels:

- Compliance scenarios require 17-20 MGPY of RD starting in 2016
- No renewable diesel recorded in first three quarters of 2016
- Because renewable diesel is an opt-in fuel, it is unclear how much might be available to Oregon or at what CI.
- California already taking significant portion of Singapore production available to the US

Even if renewable diesel is used in Oregon, current CIs for waste oil and tallow-based RD would yield deficit generating ULSD by 2020.

Source: ICF, ODEQ, CARB, BCG analysis

Alternative fuels face infrastructure and vehicle availability barriers

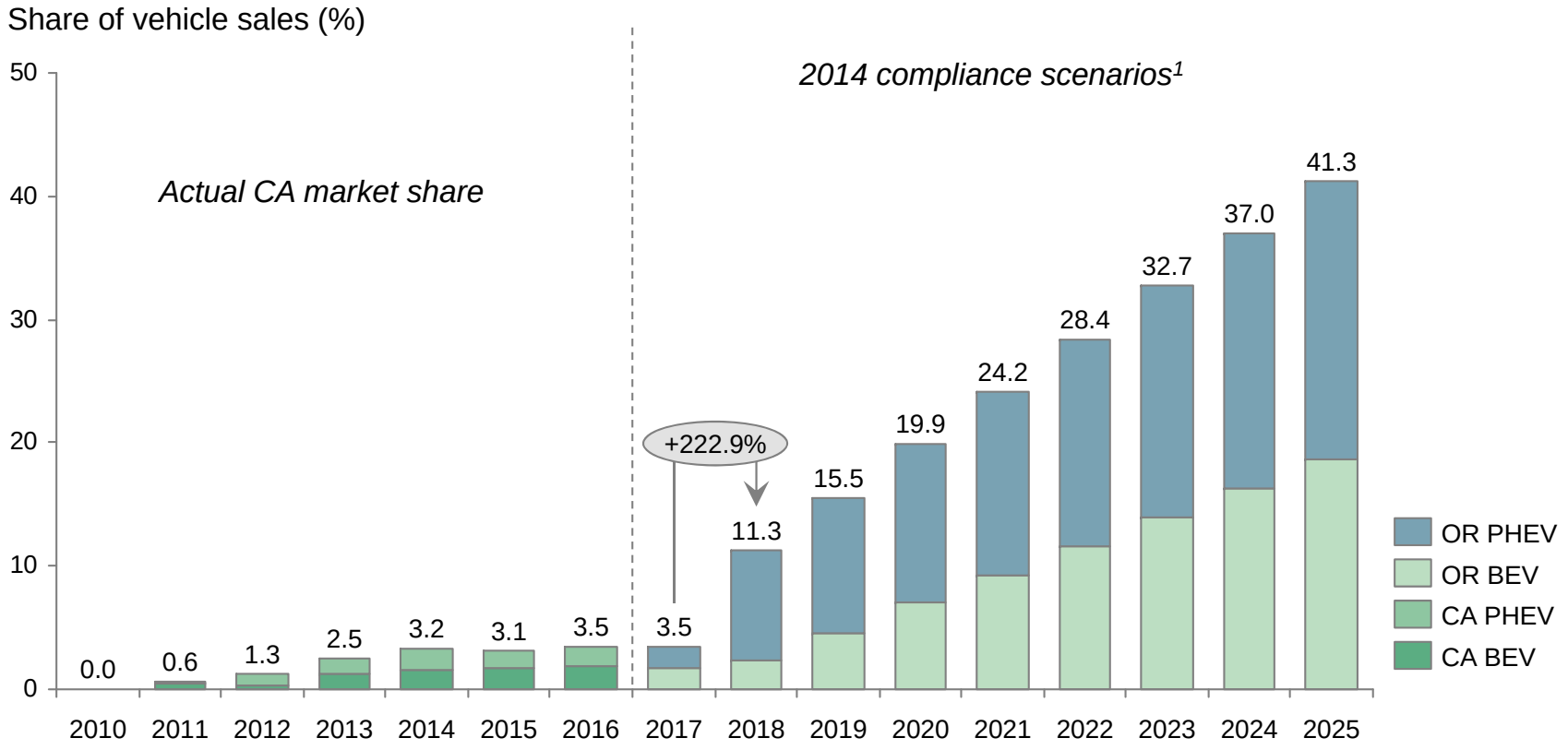
Key barriers for non-blended pathways (i.e. electricity and natural gas) to be able to generate credits are the presence of fueling infrastructure and vehicle availability in Oregon, not fuel availability.

Both infrastructure and vehicle availability are still based on optimistic growth assumptions:

- Even in California, with the most aggressive plans and funding for EVs in the country, there are projected shortfalls in EVs and infrastructure. Oregon will face even greater challenges in this area.
- Scenarios 1 and 3 assume that all PHEVs are PHEV40, even though the EIA projects a high of 60% in the US by 2025.
- There are still only five public NGV fueling stations in Oregon - it would require significant, immediate investment to provide sufficient infrastructure to get light duty NGVs to gain market share.
- California's natural gas share of diesel consumption is less than 4% with more advanced incentives and a more advanced fueling network.

Source: ICF, ODEQ, CARB, BCG analysis

Recent California EV sales plateau indicates that Oregon should also expect sales below forecast



How will EV sales meet targets in a lower oil price environment?

1. 2017 compliance scenario PEV sales volumes unavailable. Expected to be similar to 2014 compliance scenarios
Notes: Scenario 1-B5, current market share for Oregon unavailable, fleet composition ~0.3% EV in 2016
Source: California New Car Dealers Association, ICF, Oregon DMV, BCG analysis

A model with expected volume forecasts for key fuels in the market would help mitigate risks

The ODEQ should create a scenario or set of scenarios that considers the best estimate projections for each year with ranges for fuel classes.

- In addition to estimating available volumes, the forecast should inform:
  - Which pathway volumes have the most potential variation?
  - What are the specific linkages (economic incentives and infrastructure) between existing and planned production facilities and fuels coming into the LCFS region?
  - Will consumers own vehicles in sufficient quantities to be able to use the fuels?
- Instead of models being compliance driven (options and volumes of credits fit into a predefined compliance curve), they should be driven by ranges of fuel availability.
- Compliance scenarios help review possible outcomes and the potential impact of regulation. However, they are not a replacement for measuring availability of fuels.

The Oregon Clean Fuels Program faces unique issues

Oregon is later in its implementation cycle than California and British Columbia.

- Fuel suppliers in those states will have greater incentive to outbid Oregon for lower-CI fuels.

Oregon has a significant size disadvantage versus California.

- Suppliers are more likely to seek out California markets because of the higher volumes demanded for alternative fuels.

Oregon baseline accounts for gasoline blended with 10% ethanol and diesel blended with 5% biodiesel.

- Compliance will require higher blend percentages (which is unlikely in the short-term), drop in fuels, or significantly lower CI fuels at existing blend levels.