NOYES LAW CORPORATION

April 23, 2018

The Honorable Mary D. Nichols
Chair, Air Resources Board
1001 I Street
Sacramento, CA 95812

RE: Proposed LCFS Regulations Pertaining to Alternative Jet Fuel

Dear Chair Nichols:

The alternative jet fuel producers (the "AJF Producers") appreciate the opportunity to provide comments regarding the Low Carbon Fuel Standard ("LCFS") regulations under consideration by the Air Resources Board ("ARB"), pertaining to the inclusion of alternative jet fuel ("AJF") in the LCFS. This comment integrates some aspects of comments we previously submitted to the LCFS workshop process, and supersedes all of our prior informal comments to this rulemaking. The AJF Producers have worked closely and cooperatively with Airlines for American ("A4A") throughout the rulemaking process, and join the separately submitted comments of A4A.

<u>Summary of Comment</u>

The primary purpose of this letter is to express our strong support for the inclusion of AJF in the LCFS, and to acknowledge the exemplary work of ARB staff and management in working with the AJF Producers, A4A, and the aviation industry. We literally have been working with the ARB for two years in the development of this rule. Throughout this time, we have communicated steadily through numerous public workshops, meetings, informal written comments, phone calls, and emails. ARB has been actively engaged throughout this process and has thoroughly considered and integrated our input into the proposed rule. Overall, we heartily recommend adoption of the AJF regulatory proposal as proposed and concur with the specifics of the proposed regulatory structure pertaining to the rule.

There is one significant remaining issue pertaining to carbon intensity that justifies further review from both technical and policy perspectives. The technical aspect involves the assumptions underlying the California GREET3.0 ("CA-GREET") carbon intensity ("CI") benchmark score proposed for conventional jet fuel. Based on analysis of jet fuel refining that industry technical experts have developed, it is our conclusion that ARB has assumed the refinery efficiency attributable to conventional jet fuel to be approximately 5.5% more efficient than real world operations support. The practical impact of establishing a benchmark that is 5.5% too low from a technical perspective is that eligible AJF producers will generate 5.5% fewer credits than are technically justified. In a fuel commodity world that operates on basis points, a 5.5% differential is a substantial one.

The closely related policy issues pertain to the starting point and the shape of the carbon intensity curve that ARB establishes for AJF. In particular, ARB has proposed a CI curve with the same downward slope as the petroleum diesel curve even though ARB does not have regulatory authority over the CI of jet fuel. In addition, ARB has proposed a CI curve that "catches up with" the decline in the diesel curve even though AJF could not generate credits during the first eight years of the LCFS program. As a net result of these two policy decisions coupled with the unfavorable CI determination, ARB is proposing CI benchmarks for AJF that are 11% below the diesel benchmarks through 2030. If approved, the resulting Table 3 of the proposed rule would therefore result in 11% less credit generation per gallon for AJF than on-road renewable diesel fuel.

It is our impression that ARB has exercised both its technical and its policy discretion to disfavor AJF from a crediting perspective out of an abundance of caution. The underlying concern identified in the initial statement of reasons is the potential risk of diversion of fuel production from the on-road sector (renewable diesel or "RD") to the aviation sector (alternative jet fuel or "AJF").[1] In response to this concern, the decision has been taken to set the CI benchmarks for AJF in a manner that discounts credit generation opportunities so that not a single drop of California's on-road RD fuel supply is diverted into the aviation market.

We respect the diligent environmental stewardship that underlies this approach and do not question the underlying objective. However, there is an existing economic framework that very effectively protects California's on-road renewable diesel fuel supply. This economic framework consists of a durable combination of factors including production economics, fuel specifications, market forces, California climate policies, and the federal Renewable Fuel Standard (RFS). This comment describes and explains these various factors and provides empirical data to substantiate the economic value of each factor. Taken as a whole, these factors demonstrate that AJF production will remain significantly disadvantaged compared

[1] As noted in the ISOR, some stakeholders expressed concern that "if supply of low carbon biomass feedstocks is limited, AJF production may compete with production and on-road use of biomass-based diesels…" ARB ISOR, Appendix D: Draft Environmental Analysis at 66-67.

to on-road fuel even after AJF becomes eligible to generate LCFS credits. We request that ARB closely examine this economic framework; recognize that it provides ample protection to California's renewable diesel supply; and proceed to establish LCFS crediting parity for AJF production.

Overview of AJF Producers

The AJF Producers joining this letter are AltAir Fuels, Fulcrum BioEnergy, Neste, Red Rock Biofuels, and Velocys. California-based AltAir Fuels is the only dedicated renewable jet fuel refiner in the world, and is supplying commercial quantities of alternative jet fuel to United Airlines at Los Angeles International Airport (LAX) from the AltAir production facility in Paramount. Fulcrum BioEnergy is developing a facility in Reno, Nevada, and plans to supply AJF into the California market. Neste is the largest existing producer of renewable diesel for the California market and has the capability to produce alternative jet fuel. Red Rock Biofuels is developing a production facility capable of producing alternative jet fuel in Lakeview, Oregon and plans to supply AJF into the California market. Velocys provides small-scale modular Fischer-Tropsch technology to alternative jet fuel producers, and is itself developing production facilities.

Strong Support for Inclusion of AJF in the LCFS

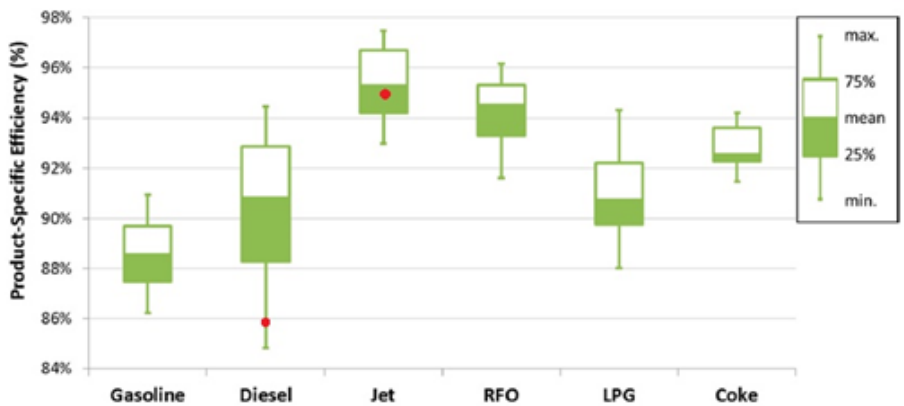
The AJF Producers are highly supportive of the LCFS program and of ARB's proposal to facilitate LCFS credit generation through opt-in participation for AJF uplifted in California. The LCFS has proven to be an effective, market-based program that has driven the development and expanded the supply of low carbon fuels in California. By including low carbon alternative jet fuels in the program, ARB will further expand the supply of less carbon-intense fuels and facilitate attainment of California's greenhouse gas ("GHG") reduction policies. By sending a clear and long-term market signal that AJF is eligible to generate LCFS credits in addition to Renewable Fuel Standard ("RFS") credits ("RINs"), ARB is facilitating investment and development in the decarbonization of the aviation sector. This pioneering work by California is crucial given the anticipated growth of the aviation sector, and the technical and energy intensive demands of this sector.

Technical Input Regarding Carbon Intensity of Conventional Jet Fuel

As noted in the summary, it is our position that from a technical perspective the proposal has incorrectly calculated the carbon intensity score for conventional jet fuel in California. Based on the CA-GREET3.0 Supplemental Document and Tables of Changes (March 6, 2018), the refining efficiencies used for petroleum jet fuel and ultra-low sulfur diesel fuel ("ULSD") in CA-GREET3.0 are 94.9% and

85.87% respectively. The 9.03% difference in efficiency is a substantial difference between two very similar middle distillate products produced at the same California refineries. The efficiency difference is not sufficiently supported in the record to enable a complete response. However, the figures appear to be based on Linear Programming (LP) results for California refineries provided by Argonne. What appears to be the primary technical reference in the ISOR for the refinery effiency assumptions[2] includes the following table as Figure 7.

Figure 7. Average product shares (by energy) from major processing units in 43 refineries.



The original table does not include the two red dots which have been added here to illustrate the refining efficiencies used for petroleum jet and ULSD in CA-GREET3.0. This figure illustrates that the ULSD refining efficiency used to establish the CI value for conventional jet fuel represents a value close to the low-end of the diesel range; whereas the jet refining efficiency is close to the mean value of the jet range. The same underlying Argonne technical paper also indicates that the difference between production-weighted average efficiencies of diesel and jet fuel is 4.4%. In contrast, ARB selected a difference of 9.03% for its modeling in CA-GREET3.0, more than double the difference in the Argonne GREET paper.

In the underlying technical paper, Elgowainy et al. state that "The wide range of diesel efficiencies is attributable to the various pathways for diesel production in refineries. When less diesel yield is desired, the production pathway becomes more efficient because a larger share of the diesel product is produced directly from the distillation tower. However, when more diesel production is desired, a larger share

[2] ISOR, p. XII-19, footnote 53 provides the following reference from which the table has been extracted: "Energy Efficiency and Greenhouse Gas Emission Intensity of Petroleum Products at U.S. Refineries," Amgad Elgowainy, Jeongwoo Han, Hao Cai, Michael Wang, Grant S. Forman , Vincent B. Divita, May 2014. https://greet.es.anl.gov/publication-energy-efficiency-refineries .

of the diesel product comes from the hydrocracker (with extensive hydrogen use), the coker, and the FCC units."[3]

This same reasoning appears equally applicable to petroleum jet. To better explain its technical approach, ARB should provide more information about the sensitivities of the LP model used. For example, ARB should indicate the refining efficiency for the marginal petroleum jet in the event that jet fuel demand is higher than assumed.

As the refining efficiency is a key parameter when determining the CI of producing a petroleum product, the following changes should be made to CA-GREET3.0 to reflect the impact of a more accurate refining efficiency assumption. Two different cases are specified below.

Case A:

- Petroleum jet fuel efficiency changed from 94.9 to 91.1%.[4]
- Refinery still gas consumption to reflect the change in efficiency.[5]
- Petcoke consumption to reflect the the change in efficiency[6]

Resulting CI of conventional petroleum jet in 2010 is 94.04 gCO2e/MJ.

Case B:

- Petroleum jet fuel efficiency from 94.9 to 86.4%, if which case the difference between ULSD at 85.9 and petroleum jet would be 0.5 percentage points. The difference of 0.5% in refining efficiency of diesel and jet is mentioned in the paper by Palou-Rivera et.
- Same changes as in case A regarding still gas and petcoke consumption

Resulting CI of conventional petroleum jet in 2010 is 99.00 gCO2e/MJ.

Accordingly, ARB has assumed the refinery efficiency attributable to jet fuel to be approximately 5.5% more efficient than real world operations support resulting in a 2010 CI score of 89.84. This incorrect assumption inappropriately discounts the CI

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[3] "Energy Efficiency and Greenhouse Gas Emission Intensity of Petroleum Products at U.S. Refineries," Amgad Elgowainy, Jeongwoo Han, Hao Cai, Michael Wang, Grant S. Forman , Vincent B. Divita, May 2014. https://greet.es.anl.gov/publication-energy-efficiency-refineries .

[4] The figure of 91.1% is based on a paper by Palou-Rivera et. al, Updates to Petroleum Refining and Upstream Emissions, Argonne National Laboratory 2011. https://greet.es.anl.gov/files/petroleum

[5] The CA-GREET3.0 spreadsheet reference here is JetFuel_WTP Cell: C264 Petroleum!$AV120*(1/B$227-1)/(1/Petroleum!$AU$82-1)

[6] The CA-GREET3.0 reference is Sheet: JetFuel_WTP Cell: C260 Petroleum!$AV115*(1/B$227-1)/(1/Petroleum!$AU$82-1)

of jet fuel as compared to on-road diesel resulting in lesser credit generation opportunities for AJF. While both cases illustrated rely upon reasonable assumptions about the real world refining efficiencies, the AJF Producers respectfully submit that the appropriate refining efficiency for use in setting the AJF baseline should be 91.1%. This approach is illustrated by Case A and is strongly supported and justified in the technical literature including the paper cited by ARB in the ISOR.

After setting the baseline CI for conventional jet fuel for 2010, the additional step that ARB utilized in setting the CI benchmark scores for AJF for 2019 and subsequent years was to further discount the 2010 CI score by 6.25%. This discount is equivalent to the CI reductions imposed on diesel fuel from 2011-2018. As established by Table 3 of the proposed regulation, this results in a CI benchmark score of 84.23 for 2019 for crediting purposes with a decline of CI to 71.87 established for 2030 and subsequent years.

With this technical background, it is appropriate to first review ARB's regulatory authority for the LCFS then revisit the relevant policy issues.

Regulatory Authority

The underlying authority for the LCFS is California's Global Warming Solutions Act of 2006 (AB 32) which set a goal of reducing greenhouse gas (GHG) emissions in the state to 1990 levels by 2020 and charged ARB with developing and implementing regulations in various areas to achieve that goal. In January 2007, then-Governor Arnold Schwarzenegger issued Executive Order S-01-07 calling on CARB to determine whether or not a low carbon fuel standard could be adopted as a standalone measure under AB 32. In April 2010, ARB adopted a final set of regulations for the LCFS that is now codified at Cal. Code Regs. tit. 17, §§ 95480 et seq.[7] The regulations set out a comprehensive program to reduce the carbon intensity of California's transportation fuels by at least 10% by 2020. To do this, the LCFS program establishes reporting, performance and record keeping requirements related to the full life-cycle carbon intensity of fuels sold in or imported into California.

The LCFS applies to transportation fuels that are "sold, supplied, or offered for sale in California" and to "any person who as a regulated party…is responsible for a transportation fuel in a calendar year." The LCFS applies to a wide range of transportation fuels and technologies including liquid and gaseous fuels such as ethanol, biodiesel, hydrogen and biomethane. However, the LCFS does not apply to aviation fuels. Conventional jet fuel remains excluded from the regulation pursuant to proposed §95482(c)(2) which provides an exemption for "Conventional

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[7] All subsequent references to regulations in this Comment also pertain to Title 17.

jet fuel or aviation gasoline." Similarly California's Regulation for the Mandatory Reporting of Greenhouse Gases ("MRR") at §95121(d) excludes the reporting of fuels "where use in exclusively aviation or marine applications can be demonstrated."

Establishing the Optimal Benchmark for AJF Credit Generation

ARB has acknowledged that its authority is markedly different in the aviation sector as compared to the on-road transportation sector. As noted in the ISOR,

> *Subjecting aircraft fuels to annual carbon intensity standards would raise federal preemption issues. However, CARB has the authority to amend the LCFS regulations to create incentives to promote the use of low carbon fuels in aircraft by allowing credit for such fuels. By promoting the voluntary production and use of alternative jet fuel, CARB would not be regulating aircraft fuels, but rather would simply be creating opportunities for airlines to better support California's GHG objectives.*[8]

Recognizing the federal preemption issues, ARB is not establishing mandatory declining standards for the CI of conventional jet fuel and aviation gasoline in California. ARB is instead providing an opt-in LCFS credit generation opportunity for AJF that is intended to have the salutary effect of achieving GHG reductions in the unregulated aviation sector. While the benchmark scores in the CI tables applicable to gasoline (Table 1) and diesel fuel (Table 2) set the annual compliance standards for regulated parties and establish the rate of credit generation for low carbon fuel producers, Table 3 for conventional jet fuel only establishes the rate of credit generation for AJF producers.

Within the regulatory context of opt-in crediting, ARB has broad discretion regarding the benchmarks it sets for credit generation purposes. The approach that ARB is proposing is established by Table 3 entitled, "LCFS Carbon Intensity Benchmarks for 2019 to 2030 for Fuels Used as a Substitute for Conventional Jet Fuel." As described by the ISOR, "the AJF annual benchmarks are anchored to the 2010 baseline for conventional jet fuel and incorporate the same annual percent reductions as the benchmarks for gasoline and diesel."[9] Based on this approach coupled with the underlying CA-GREET analysis, CARB proposes to adjust the 2010 baseline of 89.84 g CO2e/MJ for jet fuel to 84.23 g CO2e/MJ for the 2019 start date of proposed the opt-in and decrease it further thereafter. Regarding the rationale for its methods of setting the carbon intensity benchmarks for AJF, the ISOR states,

[8] CARB ISOR at III-30.

[9] CARB ISOR at II-5.

> *"To maintain consistency with the annual carbon intensity benchmark for diesel and gasoline and to create a level playing field with ground transportation fuels, staff is proposing that the annual carbon intensity benchmarks for alternative jet fuel incorporate the same annual percent reduction as the annual carbon intensity benchmarks for gasoline and diesel for 2019 through 2030."*[10]

However, given ARB' lack of authority to regulate jet fuel, consistency here is misplaced. From a policy design perspective, there are several approaches that ARB could have taken that would have yielded a better policy outcome and would have been more consistent with ARB's regulatory authority. One approach discussed during the rulemaking process would be to utilize the existing diesel curve contained in Table 2 as the applicable benchmark. This approach would place AJF credit generation on precisely the same footing as on-road renewable diesel credit generation. It would also recognize the realities of the fuel marketplace. As ARB noted in the ISOR,

> *"Second, because AJF and renewable diesel (RD) are often produced in the same facility using the same feedstock, inclusion of AJF may lead to increased investment in such facilities, thereby increasing the production of both alternative fuels."*[11]

Given that AJF and RD are often produced in the same facility, establishing the same benchmark for the two fuels would have provided both fuels with the same LCFS credit generation opportunities. Such an approach would not favor AJF production over RD production, and would not present any risk of market distortion. The AJF Producers support such an even-handed crediting mechanism, and we continue to view it as a preferred solution to the proposal.

Another benchmarking approach that would be more consistent with ARB's regulatory authority would be to establish a fixed benchmark standard for conventional jet fuel. This would be consistent with conventional jet fuel's LCFS exemption and would appropriately recognize the difference between CARB's regulatory authority over diesel and gasoline and its authority to provide a voluntary incentive in the aviation sector. Rather than a curve, such an approach would establish a fixed benchmark. It would logically be fixed at the CA-GREET 3.0 carbon intensity score that ARB determines for conventional jet fuel for 2010. As discussed in the technical section of this comment, the AJF Producers submit that the appropriate 2010 CI score for conventional jet is 94.04, whereas ARB has proposed 89.84. ARB has further proposed to reduce its benchmark of 89.84 by 6.25% which would result in a CI benchmark of 84.23 for 2019.

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[10] CARB ISOR, at III-46.

[11] CARB ISOR, at II-5.

While a fixed benchmark score is justified from a regulatory authority perspective, the AJF Producers recognize that ARB is concerned with an LCFS crediting mechanism that provides relatively more LCFS credits to alternative jet fuel than to on-road renewable diesel. We therefore would also support a hybrid approach that commences with a benchmark based on conventional jet fuel's CI score determined but declines in tandem with the diesel standard in Table 2 beginning when the CI standard for diesel fuel reaches its level.

- To illustrate this hybrid approach using the 2019 CI benchmark that ARB has proposed in Table 3 of 84.23, the benchmark for AJF would remain at 84.23 through 2027. Beginning in 2028 when the declining CI curve for diesel fuel goes below this CI level and in subsequent years, the CI benchmark for diesel fuel would also be the benchmark for AJF.
- To illustrate this hybrid approach using the CI score that is established by the refinery efficiency rating described in Case A of this comment (94.04) and without a 6.25% decline, the benchmark for AJF would be 94.04 in 2019, then would begin declining with the diesel CI score beginning in 2020 and for all subsequent years.

As previously noted, one concern expressed in the ISOR is the possibility of diverting production capacity from renewable diesel to AJF production. The following economic factors are described and quantified in today's market to illustrate that renewable diesel is well-protected against any such risk.

Economic Factors Applicable to the AJF Market

The economic factors applicable to the AJF Market that place AJF production at a structural disadvantage to on-road renewable diesel production are as follows:

1. Producers forecast less revenue from sales of alternative jet fuel than renewable diesel because jet fuel has historically sold at a discount to on-road diesel in the California market and future projections predict this trend will continue.
2. Due to the more stringent cold flow specification for jet fuel, alternative jet fuel requires more intensive processing than does on-road renewable diesel. Petroleum jet is relatively less burdened in meeting the jet specifications due to the inherent differences between fossil crude feedstocks and renewable jet feedstocks.
3. Jet fuel is not burdened at the rack by the cost of cap and trade allowances as is petroleum diesel. In today's market, this provides renewable diesel with an effective .15/gallon price discount to petroleum diesel that alternative jet fuel will not receive.

4. Conventional jet fuel pricing is also not burdened with the LCFS compliance cost that is assessed at the rack for conventional diesel fuel resulting in an effective .07/gallon price discount to petroleum diesel in today's market that alternative jet fuel will not receive.
5. Under the federal Renewable Fuel Standard (RFS), AJF receives relatively fewer RINs than on-road diesel with renewable diesel generating 1.7 RINs per gallon and renewable jet fuel generating 1.6 RINs per gallon. This results in a 6% discount on RIN generation representing .06/gallon less incentive per gallon in today's market.

Each of these economic factors is explained in additional detail in the following sections, with empirical support provided for each factor. Finally, the cumulative economic impact of these factors is considered with reference to the production of alternative jet fuel as compared to on-road renewable diesel. From a technology standpoint, this discussion focuses solely on alternative jet fuel that is produced via hydroprocessing which is the production process utilized by AltAir Fuels and Neste. This focus is necessary at this stage of industry development because, "Hydroprocessing technologies using vegetable and waste oils represent the only conversion pathways that are ready for large scale deployment (Leuphana 2011)."[12]

1. **Producers forecast less revenue from sales of alternative jet fuel than renewable diesel because jet fuel has historically sold at a discount to on-road diesel in the California market and future projections predict this trend will continue.**

First, outside market forces encourage renewable diesel production over AJF. The chief market force favoring diesel over jet fuel is the higher price historically commanded for diesel fuel in the spot market. Data from the U.S. Energy Information Administration (EIA) indicates that the spot price for jet fuel has historically been below the price of diesel, and the EIA anticipates this market dynamic to continue for the foreseeable future, chiefly due to tighter sulfur limits on diesel fuel (see Figure 1 below).[13] Average annual data on the prices of diesel and

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[12] National Renewable Energy Laboratory, Review of Biojet Fuel Conversion Technologies, Wei-Cheng Wang, Ling Tao, Jennifer Markham, Yanan Zhang, Eric Tan, Liaw Batan, Ethan Warner, and Mary Biddy Prepared under Task No. BB14.4420, at p. 6, available at https://www.nrel.gov/docs/fy16osti/66291.pdf .

[13] See U.S. Energy Information Administration spot price data at https://www.eia.gov/dnav/pet/pet_pri_spt_s1_d.htm; *see also* EIA, The Flight Paths for Biojet Fuel at 3 (noting that "non-petroleum hydrocarbons that can go into jet fuel can also be blended into diesel fuel or heating oil, both of which are projected to sell for higher prices than jet fuel in the future."). *See also*, International Renewable Energy Agency, Biofuels for Aviation at 5 (noting that producers are focused on producing renewable diesel, which has a larger market and higher sales price).

jet fuel available in Los Angeles summarized below in Figure 2 also demonstrate that the price of diesel in California generally exceeds the jet fuel price.[14]

Figure 1. EIA estimates and projections of U.S. jet fuel and distillate fuel prices, 2000—2040

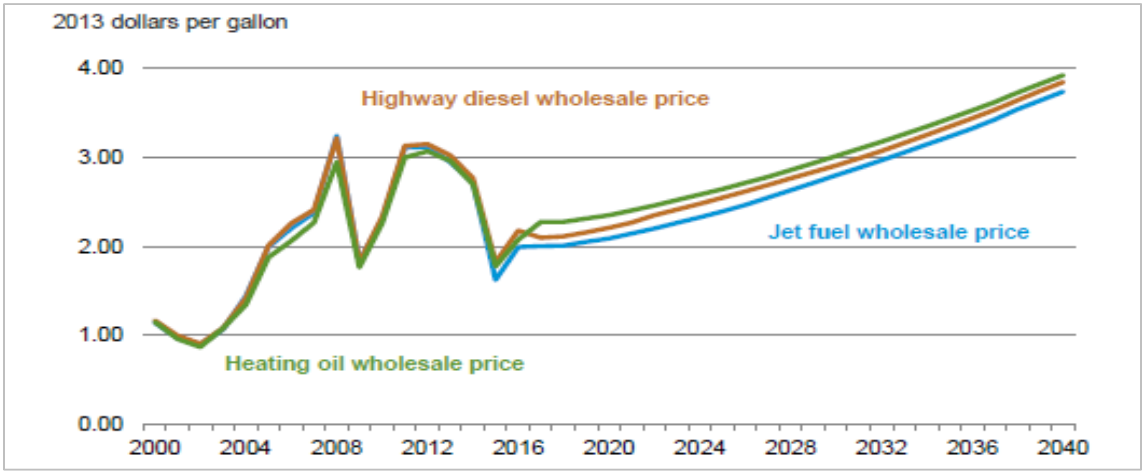
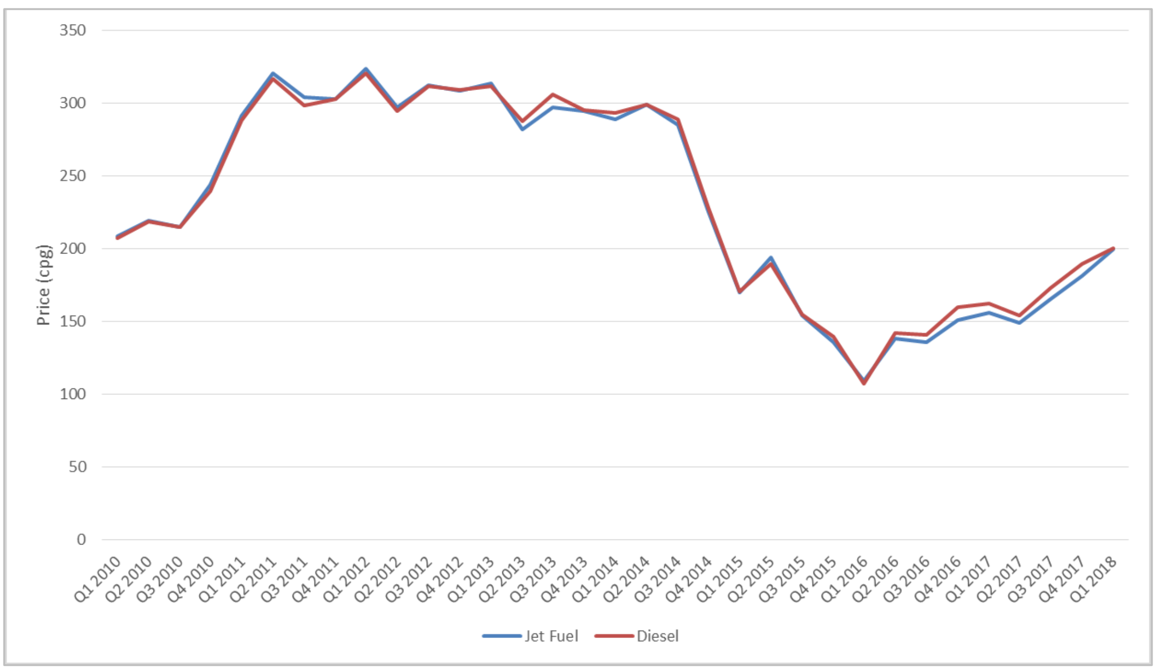


Figure 2. Jet Fuel and Ultra-Low Sulfur Diesel Prices in Los Angeles, 2010—2018



[14] Data provided by Bloomberg.

2. **Due to the more stringent cold flow specification for jet fuel, alternative jet fuel requires more intensive processing than does on-road renewable diesel. Petroleum jet is relatively less burdened in meeting the jet specifications due to the inherent differences between fossil crude feedstocks and renewable jet feedstocks.**

Due to the more stringent cold flow specifications for jet fuel, alternative jet fuel requires more intensive processing than does on-road renewable diesel. The AltAir Facility in Paramount, California is the only U.S. facility that is steadily producing and supplying commercial quantities of alternative jet fuel. AltAir supplies to the common hydrant fueling system of Los Angeles International Airport pursuant to a contract with United Airlines. AltAir purposefully designed its production process to produce renewable jet. The company estimates that it costs approximately $0.16/gallon more to make renewable jet than it would cost for a comparable renewable unit configured to only make renewable diesel. Petroleum jet is less burdened in meeting the jet specification due to the inherent differences between the composition of fossil crude feedstocks (which contain molecules in the jet and diesel boiling range) as compared to renewable jet feedstocks (which rely on cracking of a diesel boiling range molecule to form a jet molecule). Although crude oil does not necessarily need to be cracked to form a jet, it does still need to be fractionated from the diesel, which costs about $0.09/gallon. The normal crack spread does not cover this differential, so there is a preference to make diesel instead of jet in most refineries.

3. **Jet fuel is not burdened at the rack by the cost of cap and trade allowances as is petroleum diesel. In today's market, this provides renewable diesel with an effective .15/gallon price discount to petroleum diesel that alternative jet fuel will not receive.**

The various market factors are best illustrated with reference to real world pricing in today's California market. The Oil Price Information Service ("OPIS") provides daily information on petroleum prices world-wide. OPIS is widely recognized in the petroleum industry as the most reliable and accurate source for spot benchmark pricing.[15] OPIS publishes a daily report on U.S. west coast rack pricing of various petroleum products at various locations in the western U.S. This report is entitled the OPIS West Coast Spot Market Report ("OPIS Market Report"). The AJF Producers appreciate that OPIS provided a limited copyright waiver approval authorizing the submission of the March 29, 2018 OPIS Market Report to be

[15] For further information on the Oil Price Information Service and its spot pricing services, see https://www.opisnet.com/about/company-overview/

included as Exhibit A to this comment, and to be made part of the rulemaking record.

On page 5 of the OPIS Market Report, OPIS posts pricing for California Cap-at-the-Rack prices. Pursuant to California's Cap-and-Trade program, petroleum diesel fuel triggers allowance obligations for the terminal position holder that sells diesel over the rack. OPIS tracks the current market value of the allowance as expressed on a cents per gallon basis. The following chart illustrates the cost of allowances reported on March 29, 2018:

Prompt Calif. Cap-at-the-Rack Prices (cts/gal)

Product	Price	Wk Avg	30-Day Avg
Summer CARB RFG-R	11.83	11.848	11.881
Summer CARB RFG-M	11.80	11.818	11.852
Summer CARB RFG-P	11.79	11.808	11.842
Winter CARB RFG-R	11.80	11.818	11.858
Winter CARB RFG-M	11.80	11.818	11.858
Winter CARB RFG-P	11.82	11.834	11.871
CARB No.2	15.03	15.052	15.099
B5 Biodiesel	14.28	14.302	14.347
Propane	8.25	8.262	8.288
LNG (cts/DGE)	10.75	10.762	10.796

The posting that is of primary importance to AJF producers from a market perspective is the CARB No.2 posting which refers to CARB Diesel. OPIS reports that the 30-day average for allowance costs attributable to a gallon of CARB Diesel was just over fifteen cents per gallon ($0.15/gallon). In contrast to petroleum diesel suppliers, renewable diesel suppliers are not obligated to purchase and retire allowances for renewable diesel that is sold over the rack or by other methods in the California market. Conventional jet fuel sold in California also does not trigger carbon allowance obligations.

The result of this cap-and-trade obligation is to provide a relative discount of renewable diesel sold into the California market, as compared to petroleum diesel. Using the March 2018 example, if the bulk fuel pricing for petroleum diesel fuel and renewable diesel fuel was equivalent at $3.00 per gallon, a purchaser of petroleum diesel would pay an additional $0.15 to cover the allowance cost resulting in a net price of $3.15, whereas a renewable diesel purchaser would pay only the $3.00 price. If conventional jet fuel was also priced that day at $3.00 per gallon, the jet fuel purchaser would pay a net price of $3.00. Thus a biorefinery capable of producing both renewable diesel and alternative jet fuel could expect to receive a $0.15 per gallon premium for RD sales but no such premium for AJF sales.

4. **Conventional jet fuel pricing is not burdened with the LCFS compliance cost that is assessed at the rack for conventional diesel fuel resulting in an effective .07/gallon price discount to petroleum diesel in today's market that alternative jet fuel will not receive.**

The second posting that is of importance to AJF producers from a market perspective is the OPIS California Low Carbon Fuel Standard posting. Like the Cap-at-the-rack pricing, OPIS reports the compliance costs attributable to a gallon of CARB Diesel. The following posting is from the March 29th OPIS Market Report.

OPIS California Low Carbon Fuel Standard

Product	Low	High	Mean	Change
Carbon Credit ($/MT)	140.000	145.000	142.5000	1.0000
CI Pts Ethanol ($/CI)	0.01141	0.01182	0.011615	0.000080
CI Pts Biodiesel ($/CI)	0.01766	0.01829	0.017975	0.000125
Carbon CPG Diesel (cts/gal)	6.72	6.96	6.840	0.050
Carbon CPG Dsl 95% (cts/gal)	6.38	6.61	6.495	0.045
Carbon CPG Gasoline (cts/gal)	10.43	10.80	10.615	0.075
Carbon CPG Gas 90% (cts/gal)	9.38	9.72	9.550	0.070

As listed in the report, the mean underlying LCFS price was $142.50 per metric ton during the applicable time period. This resulted in a mean compliance cost per gallon of diesel fuel of $0.068/gallon or almost seven cents per gallon. As is the case in the cap-and-trade program, renewable diesel suppliers do not accrue LCFS credit obligations. Similarly, conventional jet fuel sold in California also does not trigger LCFS obligations.

The result of this LCFS obligation is to provide a supplemental discount to renewable diesel sold into the California market, as compared to petroleum diesel. Using the same March 2018 example, if the bulk fuel pricing for petroleum diesel fuel and renewable diesel fuel was equivalent at $3.00 per gallon, a purchaser of petroleum diesel would pay an additional $0.07 to cover the LCFS compliance cost plus the cap-and-trade cost of $0.15 resulting in a net price of $3.22, whereas a renewable diesel purchaser would pay only the $3.00 price. If conventional jet fuel was also priced that day at $3.00 per gallon, the jet fuel purchaser would pay a net price of $3.00. Thus a biorefinery capable of producing both renewable diesel and alternative jet fuel could expect to receive a $0.22 per gallon premium for RD sales but no such premium for AJF sales.

5. **Under the federal Renewable Fuel Standard (RFS), AJF generates relatively fewer RINs than on-road diesel with renewable diesel generating 1.7 RINs per gallon and renewable jet fuel generating 1.6 RINs per gallon. This represents a 6% discount on RINs. This results in a 6% discount on RIN generation representing .06/gallon less incentive per gallon in today's market.**

The Renewable Fuel Standard ("RFS) is a federal program that provides market based incentives to qualifying producers of renewable fuel by requiring petroleum refiners and importers to obtain renewable identification numbers ("RINs") based on their petroleum fuel volumes. There are multiple RIN categories in the RFS, with both renewable diesel and jet fuel typically generating D4 RINs, known as biomass-based diesel RINs. The key disadvantage that alternative jet fuel encounters under the RFS relates to the number of RINs generated compared to renewable diesel fuel generated on a per gallon basis. RD generates 1.7 RINs per gallon under the RFS, whereas renewable jet has been determined to generate 1.6 RINs per gallon.[16]

The OPIS Market Report also provides current market pricing for RINs. The RIN values are provided on an ethanol equivalent basis. The following table is applicable to RINs:

OPIS U.S. RIN Values (cts/RIN)

Product	Year	Low	High	Mean	Change
Corn Ethanol	2017	41.50	44.50	43.000	1.500
Corn Ethanol	2018	43.00	46.00	44.500	0.500
Biodiesel	2017	56.50	60.50	58.500	-1.500
Biodiesel	2018	64.00	68.00	66.000	-1.750
Cellulosic	2017	255.00	261.00	258.000	0.000
Cellulosic	2018	247.00	253.00	250.000	0.000
Adv. Biofuel	2017	55.50	59.50	57.500	-1.500
Adv. Biofuel	2018	63.00	67.00	65.000	-1.750

The applicable RIN value is listed here as "Biodiesel" with a 2016 mean price of $0.66 per D4 RIN. Adjusting the RIN value for the energy density of renewable diesel results in a RIN value per renewable diesel gallon of $1.056. The RIN generation discount per gallon between 1.6 RINs for AJF as compared with 1.7

[16] 40 CFR §80.1415(b)(4) provides, "Non-ester renewable diesel with a lower heating value of at least 123,500 Btu/gal shall have an equivalence value of 1.7." Regarding renewable jet RIN generation crediting of 1.6, see EPA Compliance Help 2018, "RIN Generation and Renewable Fuel Volume by Fuel Type," at https://www.epa.gov/fuels-registration-reporting-and-compliance-help/2018-renewable-fuel-standard-data

RINs for RD results in approximately a 6% discount. Thus a RD producer would receive more than six cents per gallon ($.06) than an AJF producer would.

The result of this RFS discount is to provide an additional policy incentive to renewable diesel sold into the market, that is supplemental to the favorable California policy incentives. Using the same March 2018 example, the cap-and-trade cost of $0.15 plus the LCFS compliance cost results in a net price of $3.22, whereas a renewable diesel purchaser would pay only the $3.00 price. If conventional jet fuel was also priced that day at $3.00 per gallon, the jet fuel purchaser would pay a net price of $3.00. Thus a biorefinery capable of producing both renewable diesel and alternative jet fuel could expect to receive a $0.22 per gallon premium for RD sales but no such premium for AJF sales. In addition, the RD gallon would generate an additional $.06 in RIN value resulting in a net policy premium for RD of $0.28 as compared to AJF.

Environmental analysis

The AJF producers support CARB's conclusion in the Draft Environmental Assessment conducted pursuant to 17 CCR 6005 that "[w]ithout the use of AJFs, it could be difficult to achieve long-term GHG emission reduction goals . . ."[17] in the State, and that the "likely outcome of the Proposed Amendments' inclusion of AJF is . . . that the total air quality benefit increases."[18] As further discussed in the comments of A4A, independent analysis by NREL and ACRP confirm the reduction in criteria pollutant emissions from use of AJF.

Conclusion

As examined in some detail by this comment and supported by market data, the production of renewable diesel is inherently favored over alternative jet fuel. While we have not attempted to assign a precise figure to it, conventional jet fuel typically sells at a discount to diesel fuel in the California market and this is predicted by the U.S. Energy Information Administration to continue in the future. According to the one existing commercial producer, alternative jet fuel production results in an additional cost per gallon of about $0.07 per gallon. The combined California and federal policy factors result in $0.28 of policy premium that favors RD production. These factors are cumulative and thus the existing policy and market landscape is heavily slanted to favor RD production over AJF production.

As currently proposed, the LCFS will slant another long-term policy in favor of renewable diesel over alternative jet fuel. Specifically, the CI benchmark values for

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[17] CARB ISOR, App. D at 207.

[18] CARB ISOR, App. D at 67.

jet in Table 3 establish an 11% crediting disadvantage compared to the diesel benchmark values contained in Table 2. In today's market, this 11% disadvantage translates in economic terms to a $0.16 discount in LCFS credits generated. Thus the production of alternative jet fuel will remain economically disadvantaged in yet another policy program even with the recognized benefit of LCFS program inclusion.

It is within this landscape that the technical and policy issues pertaining to carbon intensity and LCFS credit generation should be evaluated. The AJF Producers recognize both the general LCFS principle of fuel neutrality and the importance of RD in fulfilling California's climate and air quality goals. We therefore request a revised CI table for jet fuel that immediately establishes crediting parity between AJF and RD fuel, or moves to crediting parity between the two fuels as quickly as possible.

Thank you for your consideration of our input. Please contact us if any further input would be helpful. We look forward to continuing to provide input to this proceeding.

Sincerely,

Graham Noyes

Exhibit A

OPIS West Coast Spot Market Report

A Daily Report on U.S. West Coast Spot Prices plus News and Commentary

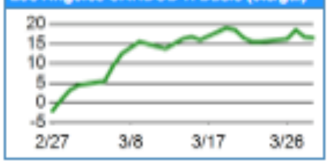
OPIS By IHS Markit

March 29, 2018

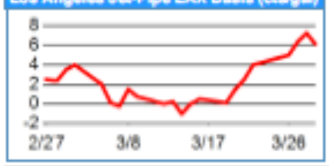
West Coast 30-Day Average Snapshot

Los Angeles CARB No. 2 Basis (cts/gal)

Los Angeles CARBOB-R Basis (cts/gal)



Los Angeles Jet-Pipe LAX Basis (cts/gal)



HOLIDAY NOTICE: U.S. OPIS Spot Reports will not be published on Friday, March 30, in observance of the Good Friday holiday. Publication will resume as normal on Monday, April 2.

SUBSCRIBER NOTICE: As part of our ongoing commitment to ensure our spot market assessments remain relevant, accurate and comprehensive, OPIS is declaring a two-week open-comment period on all of its spot-pricing methodologies. From Friday, March 16, to the close of business Friday, March 30, please direct comments about our spot methodologies to Energy-SpotComplianceGroup@opisnet.com. To review OPIS' existing methodology for its various products and reports, please visit www.opisnet.com/about/methodology.aspx. OPIS' editorial and management team will examine each comment and evaluate whether the feedback ought to result in an alteration, enhancement or clarification of our methodology. Although comments are welcome any time of the year, we will repeat our open-comment period every three months.

PACIFIC NORTHWEST GASOLINE PRICES POP 4CTS/GAL

3/29/2018 - Oil prices ended the first quarter very similar to the way they moved within the confines of the first 88 days of the year, with fairly narrow ranges defining key energy contracts.

May WTI rose 56cts/bbl to $64.94/bbl with June assessed at $64.87/bbl. A reduction in the rig count helped promote some strength, but it might take something more considerable to retake ground above $66/bbl for domestic crude.

Reports from the Midland area suggest that production is outstripping pipeline takeaway capacity, with Midland WTI trading at $3.75/bbl under futures. That has inspired some opportunistic traders to begin looking at rail as a possible solution for a growing bottleneck.

Brent crude was worth $69.36/bbl in June, with the expiring May contract

(Continued on Page 3)

New York Mercantile Exchange at Settlement

WTI Crude Oil ($/bbl)		
Month	Price	Change
MAY	64.94	0.56
JUN	64.87	0.52
JUL	64.54	0.48

RBOB Unleaded (cts/gal)		
Month	Price	Change
APR	201.79	0.63
MAY	202.06	0.14
JUN	202.50	0.32

ULSD (cts/gal)		
Month	Price	Change
APR	202.84	1.36
MAY	202.10	0.71
JUN	201.90	0.74

L.A. 3-2-1 Crack Spread*	
Price ($/bbl)	Change
20.11	-0.62

*Crack is based on midpoints for L.A. CARBOB Gasoline, CARB and ANS

Snapshot of OPIS Mean West Coast Prompt Month Spot Pipeline Prices and Basis Differentials (cts/gal)

	Los Angeles				Bay Area				Pacific Northwest			
	Physical Prices		Basis Diff.		Physical Prices		Basis Diff.		Physical Prices		Basis Diff.	
Product	Mean	Change	Mean	Change	Mean	Change	Mean	Change	Mean	Change	Mean	Change
ULS No. 2	210.225	1.085	8.125	0.375	205.100	-0.290	3.000	-1.000	225.850	3.460	23.750	2.750
CARB No. 2	210.225	1.085	8.125	0.375	205.100	-0.290	3.000	-1.000	-- --	-- --	-- --	-- --
Sub-oct Reg	218.060	-0.110	16.000	-0.250	211.060	2.640	9.000	2.500	218.060	4.150	16.000	3.250
Sub-oct Pre	233.560	-0.110	31.500	-0.250	239.060	2.640	37.000	2.500	252.560	4.150	50.500	3.250
CARBOB-R**	218.560	-0.110	16.500	-0.250	214.560	2.640	12.500	2.500	218.060	4.150	16.000	3.250
CARBOB-P**	233.560	-0.110	31.500	-0.250	240.560	2.640	38.500	2.500	252.560	4.150	50.500	3.250
JET **	208.225	-0.415	6.125	-1.125	208.225	-0.415	6.125	-1.125	210.725	-0.415	8.625	-1.125
JET-WTG AVG	208.350	-0.375	6.250	-1.085	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --
B5	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	229.850	3.460	27.750	2.750
AZRBOB-R	219.060	-0.110	17.000	-0.250	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --
AZRBOB-P	234.060	-0.110	32.000	-0.250	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --
CARB RFG-R	213.400	0.095	-- --	-- --	209.800	2.570	-- --	-- --	-- --	-- --	-- --	-- --
CARB RFG-P	228.900	0.095	-- --	-- --	233.200	2.570	-- --	-- --	-- --	-- --	-- --	-- --

Full price display on page 2. Note: **L.A. Jet Fuel is JET-Pipe LAX, Bay Area Jet Fuel is JET-Pipe, PNW CARBOB-R is Sub-octane-Reg (FOB Seattle), PNW CARBOB-P is Sub-octane-Pre (FOB Seattle).

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Exhibit A

OPIS West Coast Prompt Spot Pipeline Prices and Basis Differentials (cts/gal)

Los Angeles

		Physical Prices				Basis Differentials				
Product	Timing	Low	High	Mean	Change	Low	High	Mean	Change	Wt. Avg
ULS NO. 2	APR	209.60	210.85	210.225	1.085	7.50	8.75	8.125	0.375	--
CARB No. 2	APR	209.60	210.85	210.225	1.085	7.50	8.75	8.125	0.375	210.495
JET-PipeLAX	APR	208.10	208.35	208.225	-0.415	6.00	6.25	6.125	-1.125	208.350
Sub-Oct Reg 9.0 RVP	APR	217.56	218.56	218.060	-0.110	15.50	16.50	16.000	-0.250	--
Sub-Oct Pre 9.0 RVP	APR	233.06	234.06	233.560	-0.110	31.00	32.00	31.500	-0.250	--
AZRBOB-R 8.0 RVP	APR	218.56	219.56	219.060	-0.110	16.50	17.50	17.000	-0.250	--
AZRBOB-P 8.0 RVP	APR	233.56	234.56	234.060	-0.110	31.50	32.50	32.000	-0.250	--
CARBOB-R 5.99 RVP	APR	218.06	219.06	218.560	-0.110	16.00	17.00	16.500	-0.250	218.560
CARBOB-P 5.99 RVP	APR	233.06	234.06	233.560	-0.110	31.00	32.00	31.500	-0.250	--
CARB-RFG Reg	APR	212.75	214.05	213.400	0.095	--	--	--	--	--
CARB-RFG Pre	APR	226.25	227.55	226.900	0.095	--	--	--	--	--

San Francisco

		Physical Prices				Basis Differentials				
Product	Timing	Low	High	Mean	Change	Low	High	Mean	Change	Wt. Avg
ULS NO. 2	APR	204.60	205.60	205.100	-0.290	2.50	3.50	3.000	-1.000	--
CARB No. 2	APR	204.60	205.60	205.100	-0.290	2.50	3.50	3.000	-1.000	205.100
JET-Pipe	APR	208.10	208.35	208.225	-0.415	6.00	6.25	6.125	-1.125	--
Sub-Oct Reg 7.8 RVP	APR	210.56	211.56	211.060	2.640	8.50	9.50	9.000	2.500	--
Sub-Oct Pre 7.8 RVP	APR	238.56	239.56	239.060	2.640	36.50	37.50	37.000	2.500	--
CARBOB-R 5.99 RVP	APR	214.06	215.06	214.560	2.640	12.00	13.00	12.500	2.500	214.560
CARBOB-P 5.99 RVP	APR	240.06	241.06	240.560	2.640	38.00	39.00	38.500	2.500	--
CARB-RFG Reg	APR	209.15	210.45	209.800	2.570	--	--	--	--	--
CARB-RFG Pre	APR	232.55	233.85	233.200	2.570	--	--	--	--	--

Pacific Northwest

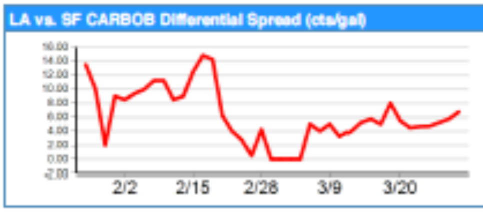
		Physical Prices				Basis Differentials			
Product	Timing	Low	High	Mean	Change	Low	High	Mean	Change
ULS NO. 2	PMT MAR	225.35	226.35	225.850	3.460	23.25	24.25	23.750	2.750
JET-Pipe	PMT MAR	210.60	210.85	210.725	-0.415	8.50	8.75	8.625	-1.125
B5	PMT MAR	229.35	230.35	229.850	3.460	27.25	28.25	27.750	2.750
Sub-Oct Reg 9.0 RVP	PMT MAR	217.56	218.56	218.060	4.150	15.50	16.50	16.000	3.250
Sub-Oct Pre 9.0 RVP	PMT MAR	252.06	253.06	252.560	4.150	50.00	51.00	50.500	3.250
Sub-Oct Reg 13.5 (Seattle)	PMT MAR	217.56	218.56	218.060	4.150	15.50	16.50	16.000	3.250
Sub-Oct Pre 13.5 (Seattle)	PMT MAR	252.06	253.06	252.560	4.150	50.00	51.00	50.500	3.250

Los Angeles Physical Forward Curve Prices

		Physical Prices				Basis Differentials			
Product	Timing	Low	High	Mean	Change	Low	High	Mean	Change
CARBOB-R 5.99 RVP	MAY	211.50	212.50	212.000	-1.180	9.00	10.00	9.500	-1.500
CARBOB-R 5.99 RVP	JUN	208.93	209.93	209.430	0.390	7.00	8.00	7.500	0.000
CARBOB-R 5.99 RVP	JUL	208.84	209.84	209.340	0.470	8.50	9.50	9.000	0.000
CARB No. 2	MAY	208.40	209.40	208.900	1.240	6.50	7.50	7.000	0.500
JET-PipeLAX	MAY	206.40	207.40	206.900	0.740	4.50	5.50	5.000	0.000
JET-PipeLAX	JUN	205.30	206.30	205.800	0.790	3.50	4.50	4.000	0.000

*NOTE: L.A gasoline prices are WEST LINE, and S.F. gasoline prices are NORTH LINE-ZERO LINE. Las Vegas gasoline is represented by L.A. regular sub-octane and premium sub-octane. AZRBOB is the year around gasoline product for Arizona. Pacific Northwest gasoline and No.2 oil prices are FOB Portland Olympic Pipeline; PNW Jet Fuel is FOB Seattle Barge. CARB RFG-R and CARB RFG-P in L.A. and S.F. is not a fungible pipeline product, but a reflection of the value of blending CARBOB with 10% ethanol. Ethanol quotes on page 4 are for ethanol delivered rail cars to West Coast locations.

LA vs. SF CARBOB Differential Spread (cts/gal)



LA vs. SF CARB Diesel Differential Spread (cts/gal)

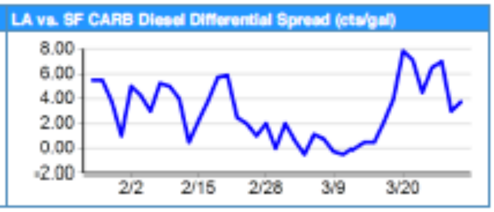


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Exhibit A

L.A. Paper Forward Curve Basis Differential (cts/gal)

Product	Timing	Low	High	Mean	Change
CARBOB	APR	12.50	13.50	13.000	0.500
CARBOB	MAY	9.50	10.50	10.000	0.000
CARBOB	Q2	11.00	12.00	11.500	0.000
CARBOB	Q3	12.00	13.00	12.500	0.000
CARB No. 2	APR	7.00	8.00	7.500	0.000
CARB No. 2	MAY	5.50	6.50	6.000	0.000
CARB No. 2	Q2	5.50	6.50	6.000	0.000
JET-PipeLAX	APR	5.25	6.25	5.750	-0.250
JET-PipeLAX	MAY	2.50	3.50	3.000	-1.250
JET-PipeLAX	Q2	3.00	4.00	3.500	0.000

PADD 5 EIA Inventory - Week Ending 03/23

Location	This Week	Last Week	Last Year	Week Change	Year Change
Gasoline	32,663	32,756	29,231	-93	3,432
No. 2 Oil	12,405	12,711	13,791	-306	-1,386
ULSD < 15ppm	11,397	11,785	12,499	-388	-1,102
Kerosene Jet	10,457	10,993	9,082	-536	1,375
Residual Fuel	5,114	4,737	4,648	377	466
Crude Oil	51,219	48,389	57,522	2,830	-6,303
Crude Input	2,593	2,536	2,434	57	159

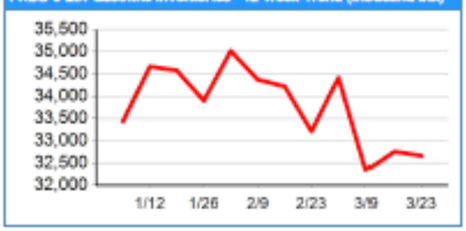
Note: Inventory levels are in thousands of barrels.

California CEC Inventory - Week Ending 03/23

Location	This Week	Last Week	Last Year	Week Change	Year Change
CARB RFG	7,587	8,048	6,055	-461	1,532
Non-Calif. Gasoline	1,350	1,080	1,570	270	-220
Gasoline Blend. Components	5,644	5,634	5,780	10	-136
CARB-Diesel	1,957	1,877	2,433	80	-476
Other Diesel	1,277	1,534	1,075	-257	202
Kerosene Jet	3,669	3,739	3,006	-70	663
Crude Oil	15,653	15,495	16,921	158	-1,268
Crude Input	12,667	12,355	12,536	312	131

Note: Inventory levels are in thousands of barrels.

PADD 5 EIA Gasoline Inventories - 12 Week Trend (thousand bbl)



PADD 5 EIA Distillate Inventories - 12 Week Trend (thousand bbl)

remaining around $70.22/bbl. There is definitely a perception that Brent may outperform WTI in April.

Gasoline saw modest increases in most spot markets, with April RBOB settling up 0.63cts/gal at $2.0179/gal while May added 0.14cts/gal to $2.0206/gal. The first quarter was an active one for refinery maintenance, but "events" or disruptions at refineries were rare. Cash prices are well above futures on the West Coast, but the key market is undoubtedly the U.S. Gulf Coast. If robust exports are maintained or increased in April, the 2017 highs for prompt RBOB may fall.

Diesel rallied slightly, with April settling at $2.0284/gal, up 1.36cts/gal while May rose 0.71cts/gal to $2.021/gal. There isn't much excitement in cash diesel markets, but there is a sense that very ample exports will continue to make for an interesting off-season.

--Tom Kloza, tkloza@opisnet.com

SOUTHERN CALIFORNIA GAS FIRM TO AID ACCELERATION OF DIESEL-TO-GAS CONVERSION FOR TRUCKS

Southern California Gas Co., which says it's the largest natural distribution utility in the U.S., said it is helping California fleets get more drivers behind the wheels of new near-zero emissions heavy-duty natural gas trucks.

The effort is part of a $21 million Prop 1B incentive pool administered by the South Coast Air Quality Management District (SCAQMD). SoCalGas representatives provided assistance on 400 Prop 1B applications throughout its service territory.

If all these applications are accepted and receive funding, SoCalGas customers will replace at least 400 diesel trucks with near-zero natural gas trucks. That's the equivalent of taking more than 22,000 passenger cars off the road, SoCalGas said.

The Prop 1B Program is intended to reduce diesel air pollution from goods movement operations and achieve the earliest possible health risk reduction, SoCalGas said. Fleet owners seeking to replace diesel trucks may be eligible for up to $100,000 toward the purchase of a new natural gas truck.

For the SCAQMD solicitation, SoCalGas customers submitted more than 150 applications, with many of these requests coming from fleets smaller than 10 trucks, the utility said. When these near-zero natural gas trucks are fueled by renewable natural gas, greenhouse gas (GHG) emissions are reduced by 80%, it said. Already, 60% of natural gas fleets in California are fueled with renewable natural gas and this number is expected to climb to about 90% by the end of this year, SoCalGas said.

The SCAQMD solicitation is one of many incentive programs SoCalGas customers used in 2017. More than 225 applications were submitted to the San Joaquin Valley Air Pollution Control District and San Diego Air Pollution Control District from SoCalGas customers. This demand far exceeded the $14 million in available incentive funding, SoCalGas said.

The transportation sector is responsible for about 40% of California's GHG emissions and more than 80% of the state's NOx, or smog-forming, emissions, the company said.

While the current Prop 1B pool solicitation is now closed, there is another incentive pool available through the SCAQMD, SoCalGas said. The Carl Moyer incentive program is open to fleets that operate in Los Angeles, Orange and Riverside counties from now until June 5. Additionally, the San Joaquin Valley Air Pollution Control District recently established a new grant incentive option for its Truck Voucher Program that would replace existing heavy-duty trucks with the cleanest, ultra-low NOx 12-Liter truck available.

--Edgar Ang, eang@opisnet.com

(Continued on Page 4)

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Exhibit A

OPIS West Coast Spot Market Report

March 29, 2018

OPIS Spot Feedstocks

	Range (cts/gal)		Diff to 70/30 (cts/gal)		Diff to WTI ($/bbl)		Diff to ANS ($/bbl)	
Product	Low	High	Low	High	Low	High	Low	High
Low Sulfur VGO	211.05	213.05	-5.00	-3.00	23.70	24.55	18.10	18.95
High Sulfur VGO	207.05	209.05	-9.00	-7.00	22.00	22.85	16.45	17.30
Light Cycle Oil	171.40	173.40	-38.85	-36.85	2.50	3.25	-- --	-- --

OPIS Spot NGL (cts/gal)

		Propane		N.Butane		Butane Mix		Isobutane		N. Gasoline	
Market	Date	Low	High	Low	High	Low	High	Low	High	Low	High
Delivered LA Basis	3/29	121.75	129.75	106.63	107.13	106.63	107.13	117.63	118.13	-- --	-- --
Delivered Bakersfield	3/29	124.75	131.75	106.63	107.13	106.63	107.13	-- --	-- --	135.13	139.88
Delivered Bay Area	3/29	117.25	118.25	106.63	107.13	106.63	107.13	117.63	118.13	-- --	-- --

WC/WTI-NYMEX/Atlantic Basin Crude Values ($/bbl)

Product	Low	High	Last	Change
Alaska North Slope	70.27	70.77	70.52	0.74
Line 63	68.27	68.77	68.52	0.74
THUMS	59.21	59.71	59.46	-0.77

Product	Low	High	Last	Change
SJV	58.46	58.96	58.71	-0.77
WTI	64.16	65.26	64.94	0.58
Brent	69.10	70.44	70.27	0.74

U.S. West Coast Crude Oil Postings ($/bbl)

Location	API	Chev	API	PMTC	API	MOBIL
Buena Vista	26.0	69.34	26.0	66.42	26.0	70.14
Hunt. Beach	-- --	-- --	20.0	61.06	-- --	-- --
Kern River	-- --	-- --	13.0	58.06	-- --	-- --
Long Beach	-- --	-- --	27.0	64.51	-- --	-- --
Midway Sunset	13.0	64.79	13.0	61.55	13.0	65.46
Wilmington	-- --	-- --	17.0	58.81	-- --	-- --
Effective Date		03/28		03/28		03/28

Location	API	STUSCO	API	UNION 76
Buena Vista	26.0	69.40	26.0	65.20
Midway Sunset	13.0	64.85	13.0	59.90
Effective Date		03/28		03/28

Today's Closing Singapore Prompt Jet Kerosene Prices

Market	Low	High	Mean	Change
FOB Singapore ($/bbl)	81.92	82.02	81.97	0.190

OPIS Ethanol Prices (cts/gal)

Market	Timing	Low	High	Mean	Change
LA CI 79.90	PROMPT	165.00	169.00	167.000	2.000
LA CI 79.90	ANY	165.00	169.00	167.000	2.000
SF CI 79.90	PROMPT	165.00	169.00	167.000	2.000
SF CI 79.90	ANY	165.00	169.00	167.000	2.000
Oregon CI 69.89	PROMPT	159.00	162.00	160.500	1.500
Washington Eth.	PROMPT	157.00	160.00	158.500	1.500
Phoenix Eth.	PROMPT	158.00	162.00	160.000	5.500

OPIS California Low Carbon Fuel Standard

Product	Low	High	Mean	Change
Carbon Credit ($/MT)	140.000	145.000	142.5000	1.0000
CI Pts Ethanol ($/CI)	0.01141	0.01182	0.011615	0.000080
CI Pts Biodiesel ($/CI)	0.01766	0.01829	0.017975	0.000125
Carbon CPG Diesel (cts/gal)	6.72	6.96	6.840	0.050
Carbon CPG Dsl 95% (cts/gal)	6.38	6.61	6.495	0.045
Carbon CPG Gasoline (cts/gal)	10.43	10.80	10.615	0.075
Carbon CPG Gas 90% (cts/gal)	9.38	9.72	9.550	0.070

OPIS U.S. RIN Values (cts/RIN)

Product	Year	Low	High	Mean	Change
Corn Ethanol	2017	41.50	44.50	43.000	1.500
Corn Ethanol	2018	43.00	46.00	44.500	0.500
Biodiesel	2017	56.50	60.50	58.500	-1.500
Biodiesel	2018	64.00	68.00	66.000	-1.750
Cellulosic	2017	255.00	261.00	258.000	0.000
Cellulosic	2018	247.00	253.00	250.000	0.000
Adv. Biofuel	2017	55.50	59.50	57.500	-1.500
Adv. Biofuel	2018	63.00	67.00	65.000	-1.750

PG&E TO OFFER 66,000 LCFS CREDITS IN AUCTION

California investor-owned utility Pacific Gas and Electric (PG&E) on Thursday said that it plans to auction on Friday approximately 66,000 California Low Carbon Fuel Standard (LCFS) credits generated from the sale of electricity for electric-vehicle fueling and compressed natural gas as a vehicular fuel.

The utility said bidders must notify the utility by 10 a.m. PT tomorrow whether they intend to participate and execute PG&E's LEAP Master Agreement for buying and selling LCFS credits.

PG&E said it plans to notify winning buyers no later than 1 p.m. PT Friday.

PG&E's minimum bid quantity is 1,000 credits. Bidders must submit both quantity and price in their bids. PG&E said it reserves the right to award partial bid quantities. A weighted average of winning bids for cleared quantities will be used to calculate the transaction price.

LCFS credit prices have steadily increased for much of the past week. They were reported in the range of $142-$145/credit early Thursday after being assessed by OPIS at $141.50/credit on Wednesday.

OPIS on Feb. 14 assessed the LCFS credit at an all-time high of $151.50/credit, but the assessment dipped to a 2018 low of $111/credit on Feb. 27. Prices have since rebounded, with Wednesday's assessment holding $21/credit above the month-ago level.

--Jordan Godwin, jgodwin@opisnet.com

WEST COAST REFINED PRODUCTS LOGIC:

L.A. CARBOB-R 5.99 RVP: April prompt was assessed at NYMEX May RBOB contract plus 16.5cts/gal, based on a trade at that level.

L.A. CARB No. 2: April prompt was assessed at the NYMEX May ULSD contract plus 8.125cts/gal, based on trades at plus 7.5cts/gal to plus 8.75cts/gal.

L.A. ULS No. 2: April prompt was assessed at the NYMEX May ULSD contract plus 8.125cts/gal, based on a flat regrade relationship to L.A. CARB No. 2.

L.A. JET-Pipe LAX: April prompt was assessed at the NYMEX May ULSD contract plus 6.125cts/gal, based on a trade at plus 6.25cts/gal and a subsequent offer at plus 6cts/gal.

S.F. CARBOB-R 5.99 RVP: April prompt was assessed at the

(Continued on Page 5)

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Exhibit A

OPIS West Coast Spot Market Report

March 29, 2018

Calif. Carbon Allowance Assessments ($/mt)

Vintage	Timing	Low	High	Mean
Previous Yr.	PMT APR '18	14.71	14.73	14.720
Previous Yr.	FWD DEC '18	15.08	15.10	15.090
Current Yr.	PMT APR '18	14.67	14.69	14.680
Current Yr.	FWD DEC '18	15.07	15.09	15.080
Next Yr.	PMT APR '18	14.65	14.67	14.660
Next Yr.	FWD DEC '18	15.05	15.07	15.060

Prompt Calif. Cap-at-the-Rack Prices (cts/gal)

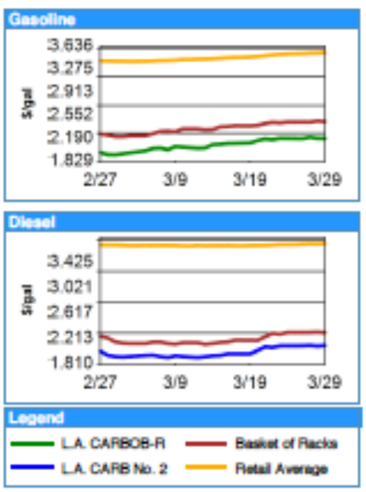
Product	Price	Wk Avg	30-Day Avg
Summer CARB RFG-R	11.83	11.848	11.881
Summer CARB RFG-M	11.80	11.818	11.852
Summer CARB RFG-P	11.79	11.808	11.842
Winter CARB RFG-R	11.80	11.818	11.858
Winter CARB RFG-M	11.80	11.818	11.858
Winter CARB RFG-P	11.82	11.834	11.871
CARB No.2	15.03	15.052	15.099
B5 Biodiesel	14.28	14.302	14.347
Propane	8.25	8.262	8.288
LNG (cts/DGE)	10.75	10.762	10.798

Today's Spot-to-Rack-to-Retail Snapshot

Gasoline ($/gal)	Price	Change
Basket of Racks	2.450	-0.010
Retail Average	3.536	0.008
L.A. CARBOB-R	2.186	-0.001

Diesel ($/gal)	Price	Change
Basket of Racks	2.307	-0.009
Retail Average	3.728	0.007
L.A. CARB No. 2	2.102	0.011

30-Day Spot-to-Rack-to-Retail Trend



NOTE: The methodology for the Rack-to-Retail Trend Snapshot can be found at: http://www.opisnet.com/about/methodology.aspx.

NYMEX May RBOB contract plus 12.5cts/gal, based on a trade at L.A. CARBOB-R minus 4cts/gal.

S.F. CARB No. 2: April prompt was assessed at the NYMEX May ULSD contract plus 3ct/gal, based on bids at plus 3cts/gal and offers at plus 3cts/gal, with differing volumes.

PNW SUB-OCT Reg 9.0 RVP: March prompt was assessed at the NYMEX May RBOB contract plus 16cts/gal, based on a trade at that level.

PNW ULS No. 2: March prompt was assessed at the NYMEX May ULSD contract plus 23.75cts/gal, based on a trade at plus 23cts/gal versus the NYMEX April ULSD contract.

WEST COAST REFINED PRODUCTS ANALYSIS:

The Pacific Northwest gasoline market saw robust price gains Thursday after the prompt market began trading against the NYMEX May RBOB contract. Sub-octane cash differentials increased 3.25cts/gal to trade at the Merc plus 16cts/gal, boosting outright prices to $2.1806/gal.

Similarly the PNW ultra-low-sulfur diesel fuel market stepped higher on a single trade. Prompt market cash differentials shot up 2.75cts/gal to a 23.75cts/gal premium to the NYMEX May ULSD contract following a trade at the April contract plus 23cts/gal. It's rare to see the PNW market reference a near expiry NYMEX contract particularly when the majority of the industry had previously decided to reference the next month contract, which is less prone to volatile prices swings. PNW ULSD flat price close the day up about 3.5cts/gal at $2.2585/gal.

Cash differentials for Los Angeles CARBOB were narrowly changed, edging just 0.25cts/gal lower following a trade at the NYMEX May RBOB contract plus 16.5cts/gal. The Southern California spot market has been trading in the mid-to- high teens over the past three weeks with demand heightened in response to abundant turnaround activity and some process hiccups.

Industry sources noted that a bit of trader length remained for the April L.A. CARBOB market, but that dynamic has yet to put any notable downward pressure on spot activity. Outright prices eased back with the light spot market dip to close at $2.1856/gal.

The San Francisco CARBOB market traded at a 4cts/gal discount to L.A. CARBOB, narrowing the N/S price spread.

The L.A. CARB diesel fuel spot market saw a range of trading over demand for different clip volumes. April prompt barrels traded at between the Merc plus 7.5cts/gal and plus 8.75cts/gal, seeing diffs firm up a tad during the session. S.F. CARB diesel fuel cash differentials eased a penny to 3cts/gal above the May ULSD contract, with bids and offers heard at that level, but counterparties couldn't get on the same page about volume.

L.A. jet fuel cash differentials traded at the Merc plus 6.25cts/gal and was later heard offered at plus 6cts/gal in the afternoon session, with no additional trades confirmed. Flat prices were down about a half cent at $2.08225/gal.

--Lisa Street, lstreet@opisnet.com

OPIS WEST COAST FUEL SUPPLY & TRANSPORTATION OPPORTUNITIES: Anyone doing business in the oil sector on the West coast knows it is uniquely regulated and difficult to navigate. Learn from the experts who have immersed themselves and have deep roots in this market. OPIS has assembled a panel of market pros to educate you on the ins and outs of what it takes to increase market share and profitability in the West coast fuel market. Then, spend the day networking over golf or a wine and olive oil tasting with newfound business partners and other peers attending this not-to-be-missed event. Learn more: https://www.opisnet.com/west-coast-fuel-supply

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Exhibit A

OPIS West Coast Spot Market Report

March 29, 2018

OPIS West Coast Spot Market Deal Log

Los Angeles

Product	Timing	Differential	Reference	kbbl	Notes
CARBOB Regular 5.99 RVP Prompt	APR	+18.50	May RBOB	25	
CARB No2 Prompt	APR	+8.50	May No2	25	
CARB No2 Prompt	APR	+8.75	May No2	10	
CARB No2 Prompt	APR	+8.50	May No2	25	
CARB No2 Prompt	APR	+7.50	May No2	10	
Jet LAX Prompt	APR	+6.25	May No2	25	

San Francisco

Product	Timing	Differential	Reference	kbbl	Notes
CARBOB Regular 5.99 RVP Prompt	APR	-4.00	LA CARBOB Regular 5.99 RVP	50	S.F. under L.A.

Pacific Northwest

Product	Timing	Differential	Reference	kbbl	Notes
Sub-Octane Unleaded 9.0 RVP Prompt	PMT MAR	+16.00	May RBOB	10	
ULS No2 Prompt	PMT MAR	+23.00	Apr No2	5	

Los Angeles Paper

Product	Timing	Differential	Reference	kbbl	Notes
Jet LAX Prompt	APR	+6.25	May No2	50	
Jet LAX Other	MAY	+3.00	Jun No2	25	
Jet LAX Prompt	APR	+6.00	May No2	50	
Jet LAX Other	MAY	+3.00	Jun No2	25	
Jet LAX Prompt	APR	+5.50	May No2	25	
Jet LAX Other	MAY	+3.00	Jun No2	25	
Jet LAX Prompt	APR	+5.50	May No2	25	
Jet LAX Prompt	APR	+5.25	May No2	50	
Jet LAX Prompt	APR	+5.75	May No2	25	
Jet LAX Prompt	APR	+5.50	May No2	25	

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Exhibit A

U.S. West Coast Price Discovery Methodology

Editors confirm and record deals done for gasoline and distillate products with a minimum pipeline size of 10,000 bbl in California and 5,000 bbl in the Pacific Northwest. As the majority of the market is done on an EFP basis, we follow deals as basis discounts or premiums to the New York Mercantile Exchange. We consider fixed-price deals only if they fall within the full-day differential range based off the NYMEX at settlement. Fixed price deals in California spot markets are converted to an EFP when reported and confirmed and then reapplied to the NYMEX settlement price.

OPIS does publish "prompt" ranges, which are trades that reflect "any month / buyers option" transactions. "Buyers option" gives the buyer the choice of taking delivery in any of the four cycles in throughout the month. In Los Angeles, OPIS identifies the prompt Kinder Morgan cycle for timing clarity but ranges are buyer option/any month lifting.

OPIS works with the Kinder Morgan Pipeline to determine the timing of the various cycles throughout the month. Typically, each month has four pumping cycles. In cases where it is close to the end of the months trading cycle, OPIS reserves the right to roll coverage forward to the more liquid month.

For the Los Angeles market, OPIS follows the Kinder Morgan West Line, and in the Bay area the OPIS assessment is for the Kinder Morgan Zero Line. In the Pacific Northwest, prices are FOB Portland - Olympic Pipeline and jet fuel is FOB Seattle barge. For complete methodology, visit http://www.opisnet.com/about/methodology.aspx

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