

SUBSCRIBER NOTICE: Effective Tuesday, January 3, OPIS is updating the carbon dioxide equivalent (CO₂e) factor for its refinery Static Carbon Emissions (STAC) assessment to 0.00083 mt/gal for 2023, which reflects the most recent annual emissions and allocations data for the refining sector published by the California Air Resources Board (CARB) and state fuel sales data published by the California Department of Tax and Fee Administration (CDTFA). The annual CO₂e update aligns with OPIS methodology practices and will not affect your report display, simply the underlying calculations for the STAC assessment.

Insights

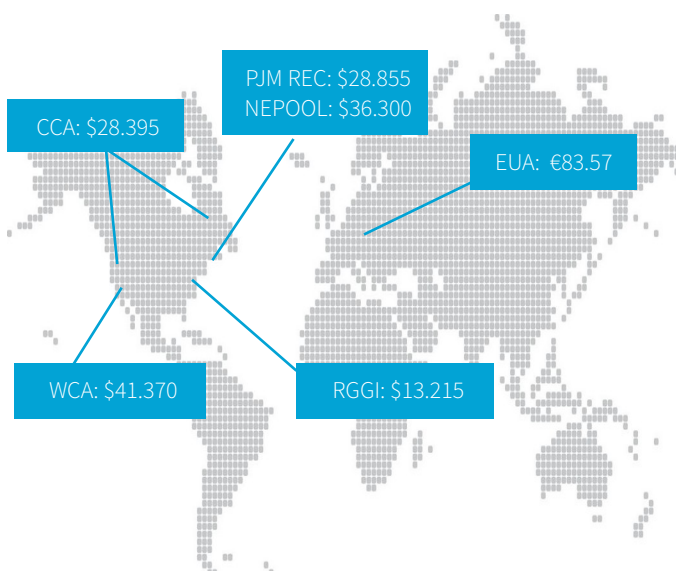
OPIS Washington Carbon Allowances Assessments Debut at \$43/mt

OPIS assessed the Washington Carbon Allowance (WCA) forward price at \$43/mt on Tuesday – as bids and offers remained at impasse for the newly minted cap-and-trade compliance instrument. *See page 2.*

2023 Preview: ETS Reforms to Reshape Europe Carbon Market

2022 was a unique year for the European Union carbon market. The benchmark ICE December 2022 European Union emissions allowances (EUAs) reached its all-time high in mid-August at €99.22 (\$105.29)/metric ton. *See page 2.*

Global Compliance Carbon Markets



Key Benchmarks

CALIFORNIA CARBON ALLOWANCES (US\$/MT)

Product	Vintage	Timing	Price	Change
Current Yr. CCA	V23	Jan'23	28.395	-0.140
Current Yr. CCA	V23	Dec'23	30.025	-0.160

CALIFORNIA CARBON OFFSETS (US\$/MT)

Product	Timing	Price	Change
Golden CCO	2023	18.550	0.000
DEBS Golden CCO	2023	23.450	0.000
Zero CCO	Jan'23	18.800	0.000

CALIFORNIA LOW CARBON FUEL STANDARD (CTS/GAL)

Product	Price	Change
Carbon Credit (\$/mt)	69.0000	-0.5000

OREGON CLEAN FUELS PROGRAM (CTS/GAL)

Product	Price	Change
Carbon Credit (\$/mt)	119.5000	0.0000

WASHINGTON CARBON ALLOWANCES (US\$/MT)

Product	Vintage	Timing	Price	Change
WCA	V23	Jan'23	41.370	---
WCA	V23	Dec'23	43.000	---

REGIONAL GREENHOUSE GAS INITIATIVE ALLOWANCES (US\$/ST)

Product	Vintage	Timing	Price	Change
RGGI	V22-V23	Jan'23	13.215	-0.195
RGGI	V22-V23	Dec'23	13.955	-0.195

EUROPEAN CARBON FUTURES

ICE Exchange	Timing	Settle	Change
EUA €/mt	Dec'23	83.57	-0.40
UKA £/mt	Dec'23	70.73	-2.52

RENEWABLE ENERGY CERTIFICATES (US\$/MWH)

Product	Vintage	Price	Change
PJM Tri-Qualified	2023	28.855	-0.070
NEPOOL Dual Qualified	2022	36.300	0.000

OPIS Washington Carbon Allowances Assessments Debut at \$43/mt

OPIS assessed the Washington Carbon Allowance (WCA) forward price at \$43/mt on Tuesday – as bids and offers remained at impasse for the newly minted cap-and-trade compliance instrument.

The Washington Cap-and-Invest Program started on Monday, marking the success of legislative work that began more than five years ago. OPIS launched WCA price assessments on Tuesday in connection with the program implementation.

The WCA January 2023 assessment at \$43/mt matched the price of the last trade -- done Thursday -- on the Nodal Exchange WCA V23 December 2023 futures contract. On Tuesday, the contract was bid at \$35/mt and offered of \$48/mt – representing a relatively wide, \$13/mt, range. The bid-side Tuesday equaled the first trade deal on the contract of \$35/mt on Dec. 5, the day it began trading.

For comparison, OPIS assessed the long-established California Carbon Allowance (CCA) V23 December 2023 price at \$30.025/mt.

Washington state's inaugural quarterly cap-and-trade auction will take place Feb. 28, 2023, with 6.2 million WCAs on offer, the state's Department of Ecology announced last month. The state's 2023 auction reserve price (ARP) is \$22.20/mt.

Washington state lawmakers passed the Climate Commitment Act in April 2021, which established a cap-and-trade program to regulate facilities emitting more than 25,000 mt CO2e/year. Bills to start a similar emissions trading program were also introduced in 2019 and 2020 but failed to pass.

For the program, the 2023 emissions budget is 63.3 million metric tons of carbon dioxide equivalent for the 2023 compliance year, and there is an annual reduction of 4.8 million mt CO2e moving forward. Compliance entities to retire up to 5% of their total obligations as carbon offsets and an additional 3% of total obligations can be covered by offsets from projects on tribal lands.

Analyst firm cCarbon.info said last month that WCA prices could reach \$50/mt in 2023, during the first year of the program.

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2023 Preview: ETS Reforms to Reshape Europe Carbon Market

2022 was a unique year for the European Union carbon market. The benchmark ICE December 2022 European Union emissions allowances (EUAs) reached its all-time high in mid-August at €99.22 (\$105.29)/metric ton, and EU legislators drafted substantial EU Emissions Trading System (ETS) reforms after months of negotiations in December.

The price surge in EUAs, caused by a combination of factors - notably the increased use of coal, which reached a record-high usage of 8 billion metric tons worldwide this year, according to the International Energy Agency - and similar all-time-high natural gas prices in the wake of Russia's invasion of Ukraine, led legislators to pursue a more autonomous and energy secure EU.

With pressing climate concerns and a growing push for decarbonization, EU lawmakers finally put those ambitions on paper in a series of draft agreements in December 2022. The numerous reforms form part of the EU's "Fit for 55" package, which aims to reduce greenhouse gas emissions by 55% by 2030 compared to 1990

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levels, and REPowerEU, the bloc's strategy to decouple from Russian fossil fuel sources and increase its own energy autonomy.

Front-loading to Hike EUA Supply in Short-term

REPowerEU has been a priority for the EU and legislators, who have provisionally agreed to set aside €300 billion for the plan. More importantly for the carbon market is that €20 billion of that will be financed via the sale of carbon emission allowances.

An estimated €12 billion will come through grants from the Innovation Fund, the EU ETS's funding arm for innovative low-carbon technology. The remaining €8 billion will come from the earlier auctioning of EUAs originally meant to be sold from 2027 to 2030, increasing the supply of EUAs in the short-term in an attempt to push down the price of carbon emissions and give utilities breathing space during the energy crisis. While an exact timeline has yet to be set on when these emission allowances would be sold, legislators are hoping this incentivizes utilities to turn to cleaner sources of energy at a faster pace as EUA prices will eventually spike toward the end of the decade.

Benjamin Lee, a carbon analyst with Energy Aspects, told OPIS that there was still uncertainty about the timing on the frontloading of EUA auctions in the coming years. The division of auction volumes across the years and when frontloading will actually commence during the calendar year are both expected to put pressure on the market, according to Lee.

"The more the agreement gets delayed, the heavier the implications for the supply of EUAs in 2023," Lee said. "It's not known exactly when the volumes will arrive if the frontloading finishes in 2026."

EU coal use to buoy EUA prices into 2023

With Russia drastically cutting down its natural gas exports to Europe, utilities and companies in the EU turned to coal as their main source of energy. According to the IEA, Europe was on track to grow its coal consumption for the second consecutive year even as the agency expects the continent to decrease its coal demand by 2025.

Yan Qin, a lead carbon analyst at Refinitiv, expects EUA prices to average €70/mt in 2023, with economic forces including the current

recession and the frontloading of EUAs supposed to take place next year dampening the price of allowances.

However, Qin expects EU utilities to maintain or increase their current coal usage into next year, which will incentivize utility hedging and support EUA prices. In a wider context, emissions from power plants covered by the EU ETS - which includes coal, natural gas and oil-fired utilities - are estimated to increase by 8% this year compared to 2021 levels, according to the Refinitiv analyst.

"This is mainly a result of surging gas prices boosting profit margins for coal plants and EU states reviving coal plants to ensure energy security," Qin told OPIS. "Consequently, we expect coal-fired power plants to be running at full steam across many European countries."

EU ETS reforms for 2023 and beyond

While key EU ETS reforms like the inclusion of the shipping sector and the creation of a separate ETS for road transport and buildings won't take off until 2024, participants in the EU carbon market will prepare for more liquidity.

The lead up to 2024 will see shipping companies negotiating and preparing to acquire emissions allowances, a move that will positively affect the EU carbon market, according to Juan Fernando Lopez, a senior policy analyst at the European Roundtable on Climate Change and Sustainable Transition.

"This is going to consolidate the EU ETS as a solid instrument," Lopez told OPIS. "It's good for the carbon market, there will be new operations, the maritime sector is not going to have free allocations and it's going to have to buy a lot of EUAs, which means more liquidity and more transactions for the market."

One of the more pressing issues is the phasing out of free allowances, which are allocated for hard-to-decarbonize sectors like the industry, steel, fertilizer and aluminum-producing companies. EU lawmakers reached a provisional deal to phase these out gradually from 2026 until 2034.

Utilities will also have to cope with a faster reduction rate in the overall EUA supply, even with frontloaded auctions. Since 2021, the supply of EUAs in the cap-and-trade system has been reduced by 2.2% per year - or just over 43 million allowances/year - but EU legislators have agreed to up the ante by reducing these by a rate of 4.3% starting in 2024 and up to 2027. This rate is then expected to increase to 4.4% from 2028 to 2030, according to EU draft proposals.

As of May 2022, there were nearly 1.45 billion allowances in circulation on the EU carbon market. If the EU's draft plans are approved in 2023, then from 2023 to 2030, nearly 420 million emission allowances would be removed in total from the EU carbon market, according to OPIS estimates. This amounts to almost a 30% reduction in EUAs by 2030 from the EU's 2021 carbon market supply.

While the EU is still finalizing details on the EU ETS reforms and the front-loading of auctions, utilities are fast becoming aware of the rising pressure to decarbonize in a post-Russian fossil fuel future.

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Germany Earns Record €13.2 Billion From Emissions Trading Programs in 2022

European and national emissions trading programs generated a record €13.2 billion euros (\$14 billion) in revenues for Germany in

2022, compared to €12.5 billion in 2021, the Federal Environment Agency, or UBA, said Tuesday.

It said revenues from auctions under the European Union Emissions Trading System (EU ETS) totaled more than €6.8 billion last year, marking a significant increase over 2021 (€5.3 billion).

In contrast, revenues under the national emissions trading scheme (nETS) for the heating and transport sector fell below the previous year's level: €6.4 billion in 2022 versus €7.2 billion in 2021, the agency said.

"Despite this contraction in the nETS, total 2022 revenues for the federal government from both systems were slightly higher than the record levels of the previous year: €12.5 billion," UBA said in a news release.

At EU ETS auctions, the average price of a unit in 2022 was €80.32 per metric ton, significantly up from €52.50/mt in 2021. The highest price paid in a German auction since the introduction of the EU ETS occurred Aug. 19, 2022, fetching €96.87/mt, it said.

"The steep price increases are due mainly to the stepped up European reform process over the past year, which aims to raise the ambitiousness of the EU ETS for the period up to 2030," Jurgen Landgrebe, a division head at the German Environment Agency, said in the release.

The proceeds will go to the Energy and Climate Fund, which supports programs such as the expansion of the charging infrastructure, development of the hydrogen industry and the promotion of energy efficiency.

--Reporting by Abdul Latheef, alatheef@opisnet.com; Editing by Michael Kelly, mkelly@opisnet.com

California Carbon Allowances (\$/mt)

Product	Vintage	Timing	Low	High	Mean	Change	Wt. Avg.	MTD
Previous Yr.	V22	Jan'23	28.07	28.72	28.395	-0.140	---	28.395
Previous Yr.	V22	Dec'23	29.70	30.35	30.025	-0.160	---	30.025
Current Yr.	V23	Jan'23	28.07	28.72	28.395	-0.140	28.157	28.395
Current Yr.	V23	Feb'23	28.22	28.87	28.545	-0.140	---	28.545
Current Yr.	V23	Mar'23	28.30	28.95	28.625	-0.210	---	28.625
Current Yr.	V23	Dec'23	29.70	30.35	30.025	-0.160	29.840	30.025
Next Yr.	V24	Jan'23	28.07	28.72	28.395	-0.140	---	28.395
Next Yr.	V24	Dec'23	29.70	30.35	30.025	-0.160	---	30.025
Forward Yr.	V25	Jan'23	28.07	28.72	28.395	-0.140	---	28.395
Forward Yr.	V25	Dec'23	29.70	30.35	30.025	-0.160	---	30.025
Advanced Yr.	V26	Jan'23	28.07	28.72	28.395	-0.140	---	28.395
Advanced Yr.	V26	Dec'23	29.70	30.35	30.025	-0.160	---	30.025

California Carbon Offsets (\$/mt)

Product	Timing	Low	High	Mean	Change	MTD
Golden CCO	2023	18.50	18.60	18.550	0.000	18.550
CCO(3)	2023	18.20	18.30	18.250	0.000	18.250
CCO(8)	2023	18.15	18.25	18.200	0.000	18.200
DEBS Golden CCO	2023	23.40	23.50	23.450	0.000	23.450
DEBS CCO(3)	2023	23.10	23.20	23.150	0.000	23.150
DEBS CCO(8)	2023	23.05	23.15	23.100	0.000	23.100
Zero CCO	Jan'23	18.75	18.85	18.800	0.000	18.800
Zero CCO	Dec'23	18.85	18.95	18.900	0.000	18.900
Zero CCO	Dec'24	19.80	19.90	19.850	0.000	19.850
Zero CCO	Dec'25	20.55	20.65	20.600	0.000	20.600

California Carbon Market Analysis

California Carbon Allowance (CCA) prices began the year stumbling as V23 January 2023 fell 14cts/mt while V23 December 2023 dropped 16cts/mt from Friday.

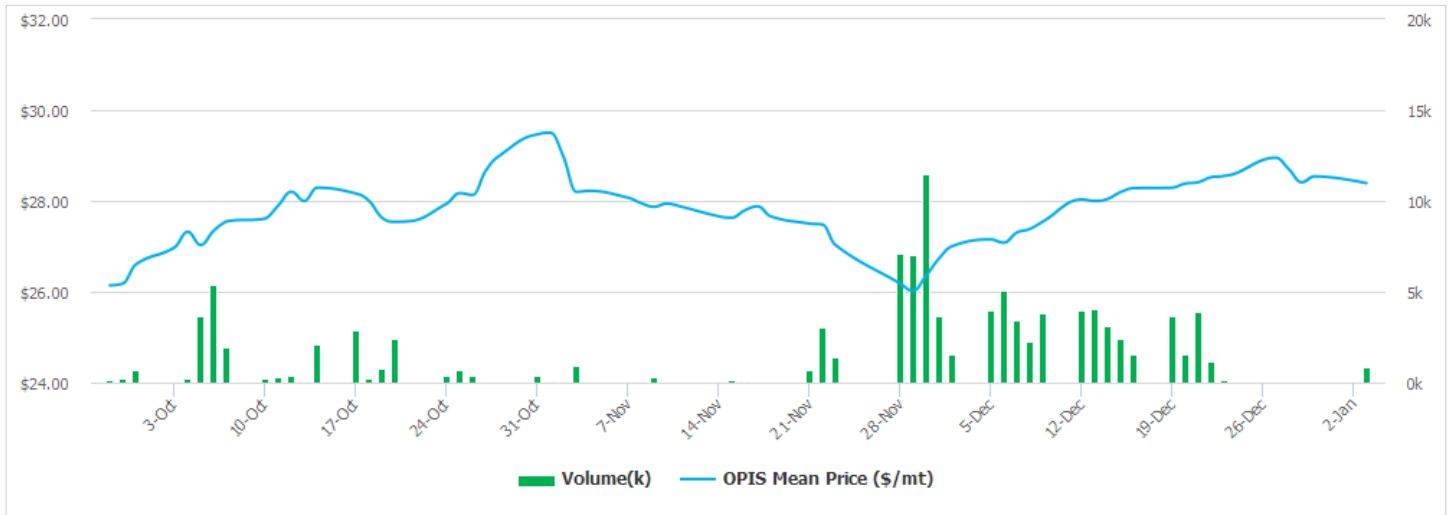
The Intercontinental Exchange (ICE) CCA V23 January 2023 contract traded between \$28.15/mt and \$28.18/mt. OPIS assessed the CCA V23 January 2023 price at \$28.395/mt, down from Friday's assessment of \$28.535/mt.

The ICE CCA V23 December 2023 contract traded between \$29.70/mt and \$30.35/mt. A spread trade valued the CCA V23 December 2023 at \$1.68/mt above V23 January 2023. OPIS assessed the CCA V23 December 2023 price at \$30.025/mt, declining from Friday's assessment of \$30.185/mt.

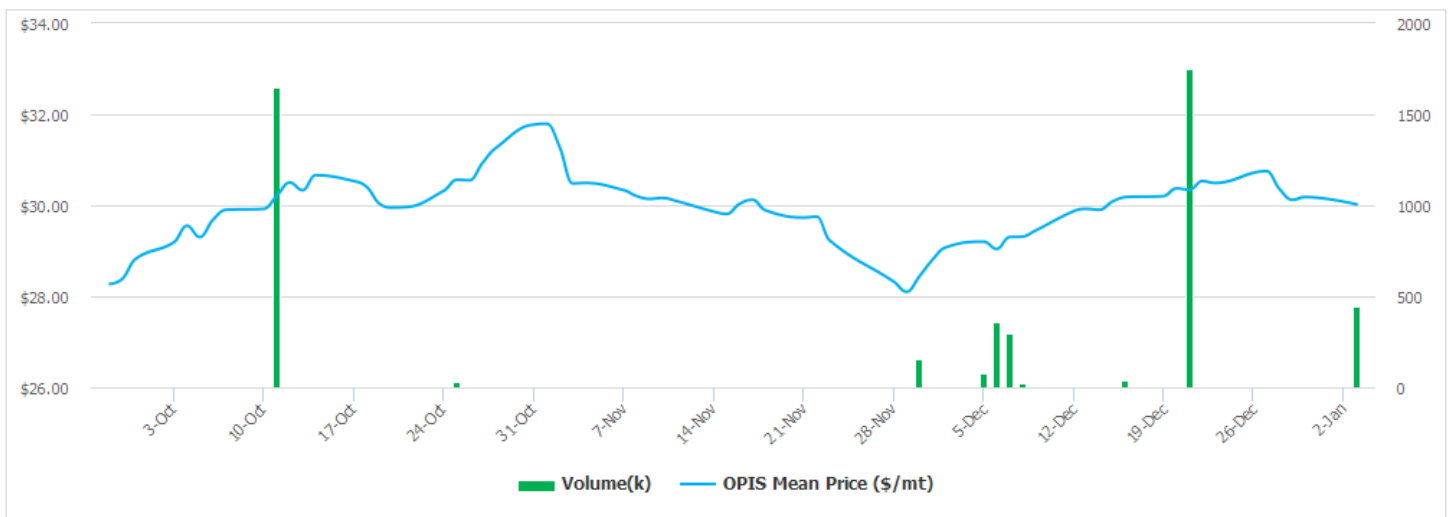
Before stepping back Tuesday, CCA prices had climbed 13cts/mt for V23 January 2023 and 6cts/mt for V23 December 2023 on Friday.

CCA prices have remained in the \$28s for prompt delivery since Dec. 12 and the \$30s for forward delivery since Dec. 15.

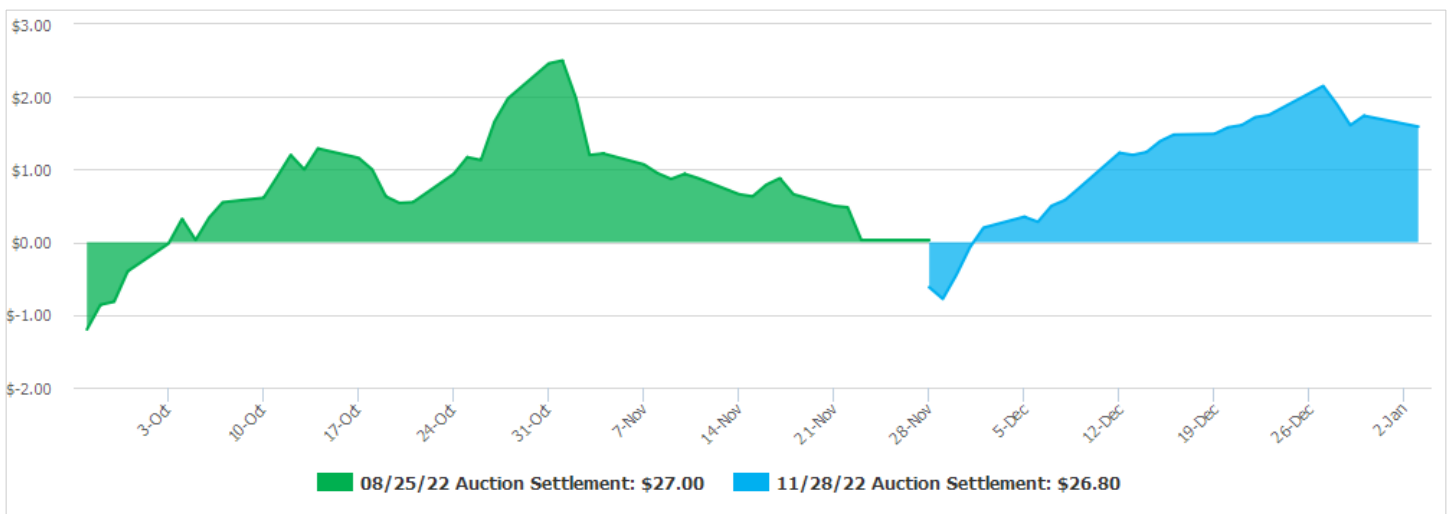
OPIS CCA CURRENT YR. PROMPT PRICES & VOLUMES



OPIS CCA CURRENT YR. FORWARD PRICES & VOLUMES



OPIS CCA CURRENT YR. PROMPT PRICE VS AUCTION SETTLEMENT SPREAD (\$/MT)



Prompt California Static Carbon Emissions Prices (cts/gal)

Product	Price	Wk. Avg.	30-Day Avg.
Refinery	2.36	2.924	2.945

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

Product	Price	Wk. Avg.	30-Day Avg.
CARB No. 2	29.08	29.283	28.398
B5 Biodiesel	27.62	27.821	26.979
Winter CARB RFG-R	22.83	22.995	22.299
Winter CARB RFG-M	22.83	22.995	22.299
Winter CARB RFG-P	22.86	23.021	22.324
LPG	16.53	16.643	16.140
LNG (cts/DGE)	20.79	20.933	20.300

Prompt Quebec Cap-at-the-Rack Prices

Product	Price (US cts/gal)	Price (CAN cts/lit)	Wk. Avg. (US cts/gal)	30-Day Avg. (US cts/gal)
Conv. 87 Unl	25.39	9.08	25.566	24.793
Conv. 89 Mid	25.39	9.08	25.566	24.793
Conv. 91 Pre	25.39	9.08	25.566	24.793
HS No. 2 Diesel	32.31	11.58	32.543	31.559
ULSD No. 2	32.31	11.58	32.543	31.559
ULSD No. 2 Winter	32.31	11.58	32.543	31.559
ULSD No. 1	32.31	11.58	32.543	31.559
Furn. Fuel Oil HS No. 2	29.39	10.54	29.598	28.703
Stove Oil LS No. 1	29.39	10.54	29.598	28.703
ULSD Furnace Oil	29.39	10.54	29.598	28.703
B5 Biodiesel	30.70	11.00	30.916	29.981
Conv. 87 Unl 10% Ethol.	22.85	8.17	23.009	22.313
Conv. 89 Mid 10% Ethol.	22.85	8.17	23.009	22.313
Conv. 91 Pre 10% Ethol.	22.85	8.17	23.009	22.313
Conv. 89 Mid 5% Ethol.	24.12	8.62	24.287	23.553

Washington Carbon Allowances (\$/mt)

Product	Vintage	Timing	Low	High	Mean	Change	Wt. Avg.	MTD
WCA	V23	Jan'23	40.87	41.87	41.370	---	41.370	41.370
WCA	V23	Dec'23	42.50	43.50	43.000	---	---	43.000

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

Product	Price	Wk. Avg.	30-Day Avg.
Summer CBOB-R 10% Ethol. CAR	33.86	33.856	33.856
Summer CBOB-M 10% Ethol. CAR	33.90	33.901	33.901
Summer CBOB-P 10% Ethol. CAR	33.94	33.945	33.945
Winter CBOB-R 10% Ethol. CAR	33.06	33.058	33.058
Winter CBOB-M 10% Ethol. CAR	33.24	33.245	33.245
Winter CBOB-P 10% Ethol. CAR	33.43	33.431	33.431
Summer Conv. 87 Unl CAR	37.60	37.603	37.603
Summer Conv. 89 Mid CAR	37.65	37.653	37.653
Summer Conv. 91 Pre CAR	37.70	37.702	37.702
Winter Conv. 87 Unl CAR	36.72	36.717	36.717
Winter Conv. 89 Mid CAR	36.92	36.924	36.924
Winter Conv. 91 Pre CAR	37.13	37.131	37.131
Propane CAR	23.83	23.834	23.834
ULSD No. 2 CAR	42.35	42.350	42.350
ULSD No. 1 CAR	42.03	42.035	42.035
B5 Biodiesel CAR	40.23	40.234	40.234

Washington Carbon Market Analysis

Washington carbon allowance (WCA) secondary market contracts were talked in a wide range Tuesday, with bids of \$35/mt against offers of \$48/mt -- leaving a large margin of where the newly minted cap-and-invest compliance instrument could next trade.

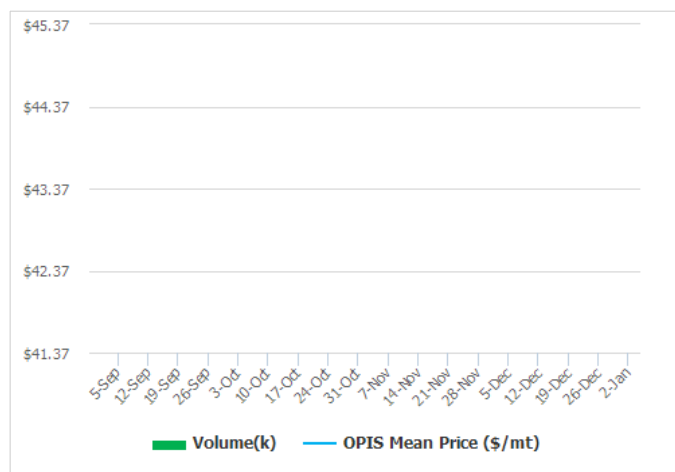
The Washington cap-and-invest program started Monday and covers about 75% of the state's carbon emissions.

There were no trades on the Nodal Exchange for the WCA V23 December 2023 contract, but the aforementioned bid and offer prices were shown.

That contract last traded at \$43/mt on Thursday. On Dec. 5 -- the day of the contract launch -- it traded at \$35/mt.

On Tuesday, OPIS assessed the WCA V23 December 2023 price at \$43/mt. Meanwhile, the WCA V23 January 2023 price was assessed at \$1.63/mt below the December 2023 delivery at \$41.37/mt.

OPIS WCA PRICES & VOLUMES



California Low Carbon Fuel Standard

Product	Low	High	Mean	Change	Wk. Avg.	MTD
Carbon Credit (\$/mt)	68.500	69.500	69.0000	-0.5000	69.1000	69.0000
Carbon Intensity Pts Ethanol (\$/CI)	0.00558	0.00566	0.005620	-0.000045	0.005631	0.005620
Carbon Intensity Pts Biodiesel (\$/CI)	0.00864	0.00877	0.008705	-0.000065	0.008717	0.008705
Carbon CPG Diesel (cts/gal)	10.41	10.56	10.485	1.100	9.564	10.485
Carbon CPG Diesel 95% (cts/gal)	9.89	10.03	9.960	1.045	9.085	9.960
Carbon CPG Gasoline (cts/gal)	10.29	10.44	10.365	0.960	9.556	10.365
Carbon CPG Gasoline 90% (cts/gal)	9.26	9.40	9.330	0.865	8.599	9.330
Carbon CPG Gasoline Crude CI Deficit (cts/gal)	0.901	0.914	0.9075	0.1430	0.7898	0.9075
Carbon CPG Gasoline Crude CI Deficit 90% (cts/gal)	0.811	0.823	0.8170	0.1290	0.7108	0.8170
Carbon CPG Diesel Crude CI Deficit (cts/gal)	1.013	1.028	1.0205	0.1610	0.8882	1.0205
Carbon CPG Diesel Crude CI Deficit 95% (cts/gal)	0.962	0.977	0.9695	0.1530	0.8438	0.9695
Carbon CPG Gasoline Combined LCFS/Crude CI Deficit (cts/gal)	11.191	11.354	11.2725	1.1030	10.3458	11.2725
Carbon CPG Gasoline Combined LCFS/Crude CI Deficit 90% (cts/gal)	10.072	10.219	10.1455	0.9930	9.3112	10.1455
Carbon CPG Diesel Combined LCFS/Crude CI Deficit (cts/gal)	11.423	11.588	11.5055	1.2610	10.4522	11.5055
Carbon CPG Diesel Combined LCFS/Crude CI Deficit 95% (cts/gal)	10.852	11.009	10.9305	1.1980	9.9296	10.9305

Oregon Clean Fuels Program

Product	Low	High	Mean	Change	Wk. Avg.	MTD
Carbon Credit (\$/mt)	117.000	122.000	119.5000	0.0000	119.5000	119.5000
Carbon Intensity Pts Ethanol (\$/CI)	0.00954	0.00994	0.009740	0.000000	0.009740	0.009740
Carbon Intensity Pts Biodiesel (\$/CI)	0.01476	0.01539	0.015075	0.000000	0.015075	0.015075
Carbon CPG Diesel (cts/gal)	13.25	13.81	13.530	2.395	11.614	13.530
Carbon CPG Diesel 95% (cts/gal)	12.59	13.12	12.855	2.275	11.035	12.855
Carbon CPG Gasoline (cts/gal)	12.12	12.64	12.380	2.150	10.660	12.380
Carbon CPG Gasoline 90% (cts/gal)	10.91	11.38	11.145	1.935	9.597	11.145

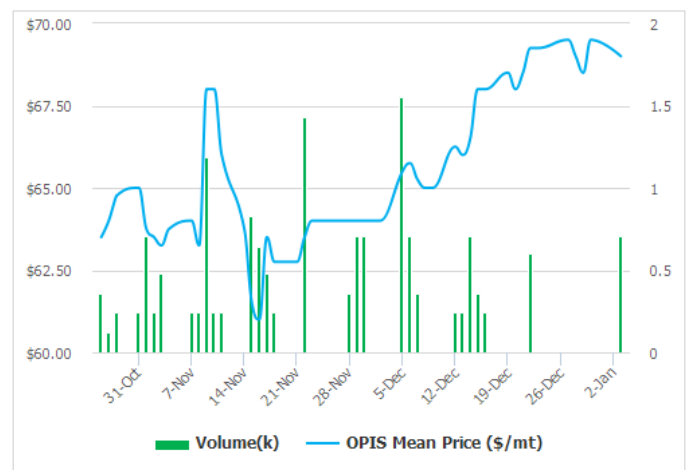
LCFS & CFP Analysis

California Low Carbon Fuel Standard credits scheduled for prompt delivery were traded at \$69/credit on Tuesday, according to market sources. OPIS assessed the credits at that price, down 50cts from Friday, when the assessment was up 25cts week to week.

Sources said LCFS credits to be transferred in the second quarter of 2023 changed hands at \$69.50/credit.

Oregon Clean Fuel Program credits were assessed at \$119.50/credit, unchanged from Friday. Credits used to comply with the Clean Fuel Standard in Washington state were assessed at \$69/credit.

OPIS LCFS CARBON CREDIT PRICES & VOLUMES



Renewable Energy Certificates (\$/Mwh)

Product	Vintage	Low	High	Mean	Change	MTD
New Jersey						
Class I	2023	28.91	28.99	28.950	0.090	28.950
Class I	2024	28.86	28.96	28.910	0.010	28.910
SREC	2023	226.50	227.50	227.000	0.750	227.000
SREC	2024	214.50	215.50	215.000	0.000	215.000
Pennsylvania						
SREC	2023	47.00	47.10	47.050	0.000	47.050
SREC	2024	45.40	45.50	45.450	0.000	45.450
Tier I	2023	28.30	28.40	28.350	0.000	28.350
Tier I	2024	27.80	27.90	27.850	0.000	27.850
Maryland						
SREC	2022	61.95	62.05	62.000	-0.050	62.000
SREC	2023	61.00	61.10	61.050	0.000	61.050
Tier I	2022	28.81	28.89	28.850	-0.050	28.850
Tier I	2023	28.70	28.80	28.750	-0.060	28.750
PJM						
Tri Qualified	2023	28.75	28.96	28.855	-0.070	28.855
Tri Qualified	2024	28.96	29.00	28.980	-0.020	28.980
Massachusetts						
Class I	2022	36.25	36.35	36.300	0.000	36.300
Class I	2023	37.45	37.55	37.500	0.000	37.500
SREC I	2022	337.00	338.00	337.500	0.000	337.500
SREC I	2023	322.50	323.50	323.000	0.000	323.000
SREC II	2022	282.00	283.00	282.500	0.000	282.500
SREC II	2023	265.00	266.00	265.500	0.000	265.500
Connecticut						
Class I	2022	36.25	36.35	36.300	0.000	36.300
Class I	2023	37.45	37.55	37.500	0.000	37.500
NEPOOL						
Dual Qualified	2022	36.25	36.35	36.300	0.000	36.300
Dual Qualified	2023	37.45	37.55	37.500	0.000	37.500

RECs Market Analysis

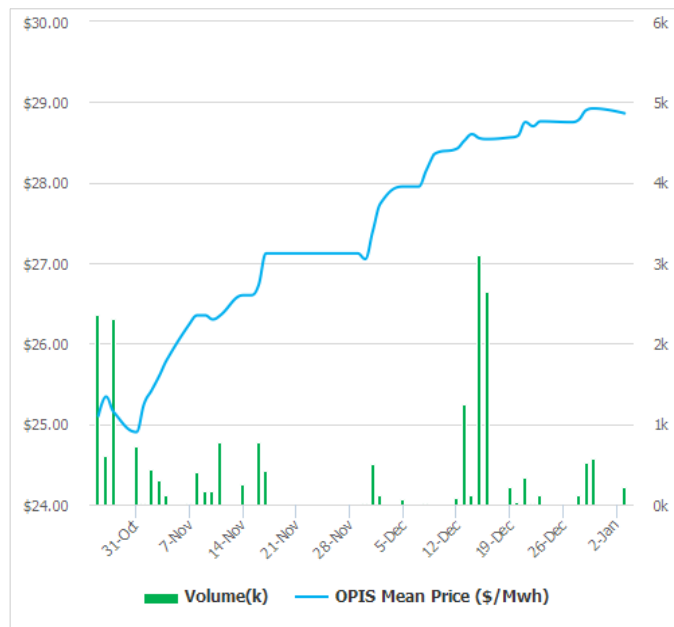
Renewable Energy Certificate (REC) prices were mixed Tuesday in Mid Atlantic markets amid moderate trading volumes.

The OPIS mean assessment for PJM Tri Qualified V23 dropped 7cts to \$28.855/MWh due to trades on the Intercontinental Exchange (ICE) between \$28.75/MWh and \$28.96/MWh. PJM Tri Qualified V24 did not trade, but was bid on ICE up to \$28.96/MWh and offered as low as \$29/MWh. It was assessed 2cts down at \$28.98/MWh.

Maryland Tier I V22 was bid on ICE up to \$28.81/MWh, offered as low as \$28.89/MWh and assessed 5cts down at \$28.85/MWh. Maryland Tier I V23 traded on ICE at \$28.75/MWh and was assessed 6cts down at that level.

In Solar REC (SREC) markets, Maryland SREC V22 traded on ICE at \$62/MWh and was assessed 5cts down at that level. New Jersey SREC V23 was bid on ICE up to \$226.50/MWh and assessed 75cts up at \$227/MWh.

OPIS FRONT YEAR PJM TRI-QUALIFIED REC PRICES & VOLUMES



Regional Greenhouse Gas Initiative Allowances (\$/st)

Product	Vintage	Timing	Low	High	Mean	Change	Wt. Avg.	MTD
RGGI	V22-V23	Jan'23	13.16	13.27	13.215	-0.195	13.215	13.215
RGGI	V22-V23	Dec'23	13.90	14.01	13.955	-0.195	13.956	13.955

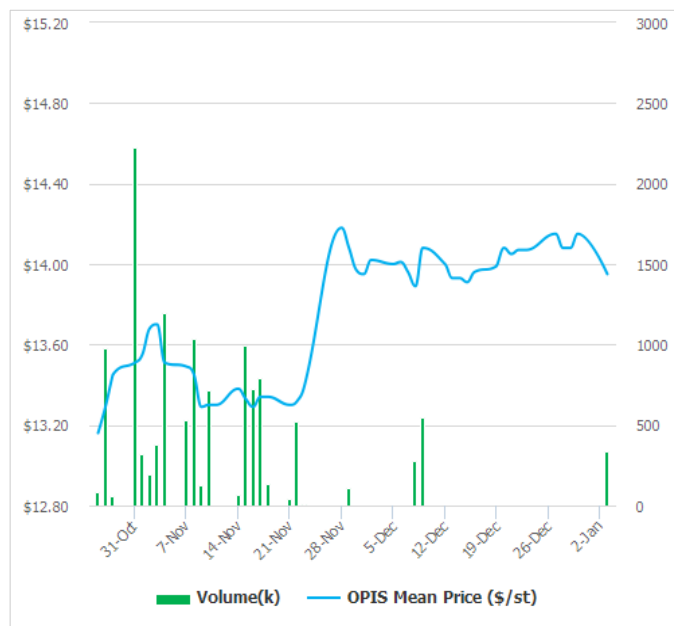
RGGI Market Analysis

Regional Greenhouse Gas Initiative prices declined 19.5cts/st Tuesday for both V23 December 2023 and V23 January 2023 OPIS assessments.

The Intercontinental Exchange (ICE) RGGI V23 December 2023 contract traded between \$13.90/st and \$14.01/st. OPIS assessed the blended RGGI V22/V23 December 2023 price at \$13.955/mt down from Friday's assessment of the RGGI December 2023 price at \$14.15/st.

The ICE RGGI V23 January 2023 contract did not trade. OPIS assessed the blended RGGI V22/V23 January 2023 price at \$13.215/mt, down from Friday's assessment of the blended V21/V22 January 2023 mean at \$13.41/st.

OPIS RGGI ALLOWANCES FORWARD PRICES & VOLUMES



Europe Carbon Market Analysis

The benchmark ICE December 2023 European Union allowances (EUAs) future contract closed at 83.57 euros/mt on Tuesday, 50 cents down from Friday's market close.

With a return to auctions scheduled for January 9, trading activity for EUAs has remained relatively low since late December, according to a morning note from Energi Danmark. Prices are likely to remain below 85 euros/mt in the coming days as auctions resume and as EU policymakers share more information on the expected frontloading of EUA auctions later this year.

China Carbon Market Analysis

The Carbon Emission Allowance (CEA) settlement on the Shanghai Environment and Energy Exchange stood at RMB55.00/t (\$7.96/t) CO2 today, flat to the previous settlement on 30 December.

The listed agreement transaction volume today was 100 tonnes, and the turnover was RMB5,500. No block agreement was transacted today.

European Carbon Futures

ICE Exchange	Timing	Low	High	Settle	Change
EUA €/mt	Jan'23	80.08	82.97	80.72	-0.35
EUA €/mt	Dec'23	81.87	86.21	83.57	-0.40
EUA €/mt	Dec'24	85.96	90.00	87.56	-0.44
UKA £/mt	Dec'23	69.86	72.80	70.73	-2.52

European Carbon Auctions

Product	Exchange	Price	Change	Volume (0'000mt)
EUA €/mt	EEX	84.10	0.69	2.57
UKA £/mt	ICE	68.00	-1.50	3.33

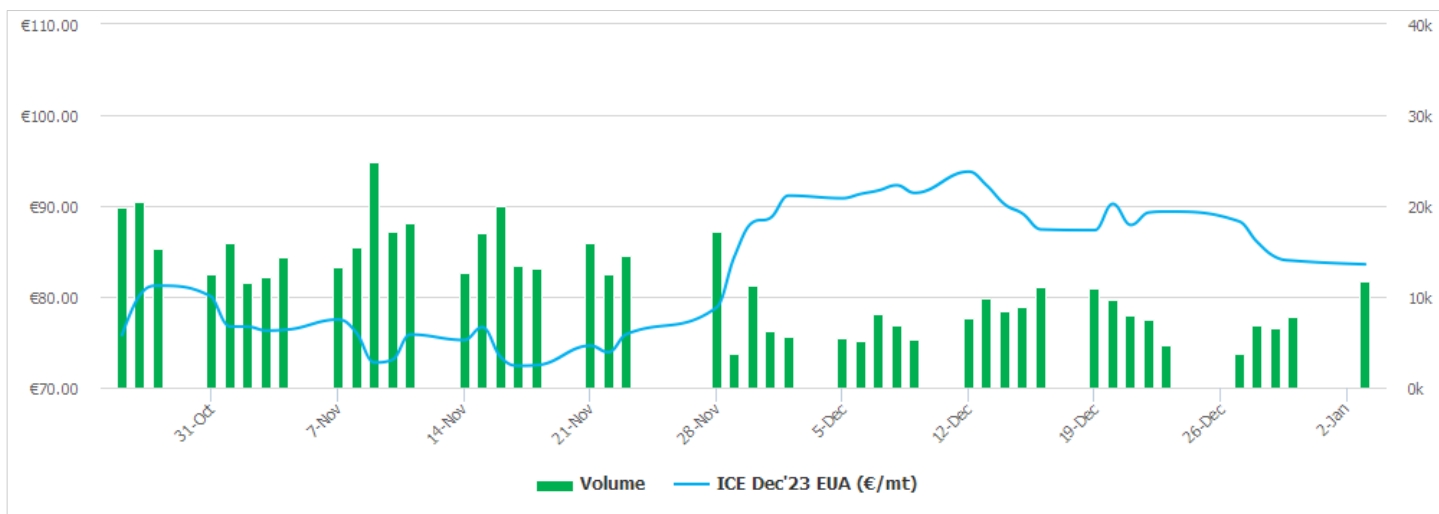
Latest auction clearing price and volume

IHS Markit Global Carbon Index

Symbol	Total Return	Change	Wt. Avg. Carbon \$	Change
GLCARB	659.30	---	47.89	---

Previous business day closing price

ICE EUA FORWARD PRICES & VOLUMES

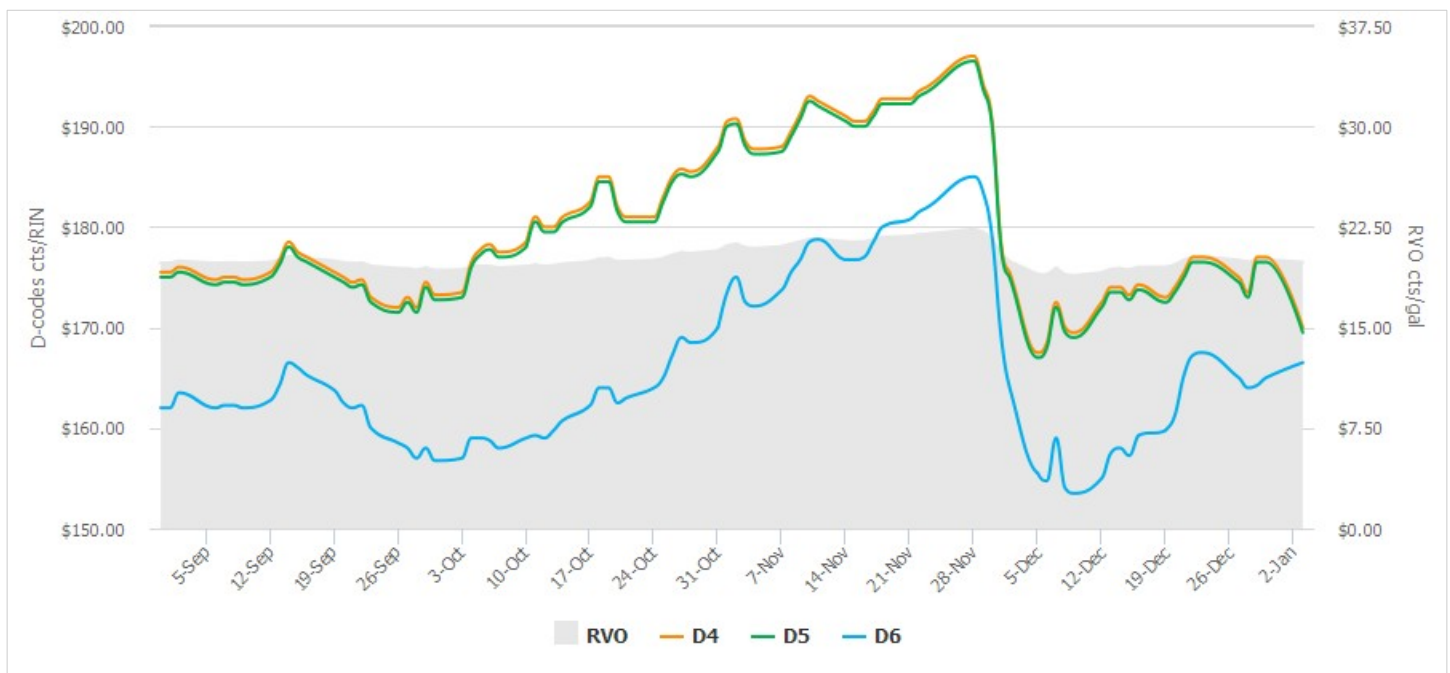


U.S. RINs (cts/RIN)

Product	Year	Low	High	Mean	Change	MTD
D6	2020	167.00	171.00	169.000	---	169.000
D6	2021	168.00	172.00	170.000	4.500	170.000
D6	2022	166.50	170.00	168.250	1.750	168.250
D6	2023	165.00	168.00	166.500	1.500	166.500
D3	2020	282.50	287.00	284.750	---	284.750
D3	2021	292.50	298.00	295.250	10.500	295.250
D3	2022	274.00	276.00	275.000	-20.250	275.000
D3	2023	235.00	236.00	235.500	-39.500	235.500
D4	2020	176.00	180.00	178.000	---	178.000
D4	2021	196.00	201.00	198.500	23.500	198.500
D4	2022	175.00	185.00	180.000	-15.500	180.000
D4	2023	168.00	172.00	170.000	-7.000	170.000
D5	2020	175.00	180.00	177.500	---	177.500
D5	2021	195.00	201.00	198.000	23.500	198.000
D5	2022	174.00	185.00	179.500	-15.500	179.500
D5	2023	167.00	172.00	169.500	-7.000	169.500
RVO (cts/gal)	2023	---	---	19.868	-0.206	19.868

D6: Corn Ethanol RIN, D3: Cellulosic RIN, D4: Biodiesel RIN, D5: Advanced Biofuel RIN, RVO: Renewable Volume Obligation.

OPIS U.S. RIN PRICES – 90 DAY TREND (CTS/RIN)



Trade Log

CALIFORNIA

Product	Timing	Cash Price (\$/mt)	Reference	Volume(K)	Notes
CCA Current Year	Jan'23	28.15	---	100	---
CCA Current Year	Jan'23	28.18	---	20	---
CCA Current Year	Jan'23	28.17	---	15	---
CCA Current Year	Jan'23	-1.68	Current Year CCA Forward Dec'23	250	V23 Jan23/Dec23
CCA Current Year	Jan'23	-0.23	Current Year CCA Prompt + 2 Mar'23	500	V23 Jan23/Mar23
CCA Current Year	Mar'23	28.40	---	10	---
CCA Current Year	Mar'23	28.30	---	10	---
CCA Current Year	Mar'23	-1.40	Current Year CCA Forward Dec'23	170	V23 Mar23/Dec23
CCA Current Year	Dec'23	30.35	---	10	---
CCA Current Year	Dec'23	30.20	---	10	---
CCA Current Year	Dec'23	30.15	---	10	---
CCA Current Year	Dec'23	30.10	---	10	---
CCA Current Year	Dec'23	30.00	---	20	---
CCA Current Year	Dec'23	29.90	---	30	---
CCA Current Year	Dec'23	29.85	---	40	---
CCA Current Year	Dec'23	29.75	---	55	---
CCA Current Year	Dec'23	29.80	---	180	---
CCA Current Year	Dec'23	29.78	---	45	---
CCA Current Year	Dec'23	29.70	---	35	---

WASHINGTON

Product	Timing	Cash Price (\$/mt)	Reference	Volume(K)	Notes
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EAST COAST

Product	Timing	Cash Price (\$/mt)	Reference	Volume(K)	Notes
RGGI Current Year	Dec'23	14.00	---	125	---
RGGI Current Year	Dec'23	14.01	---	10	---
RGGI Current Year	Dec'23	13.90	---	100	---
RGGI Current Year	Dec'23	13.95	---	100	---

RECS

Product	Vintage	Cash Price (\$/mwh)	Reference	Volume(K)	Notes
Maryland SREC Vintage 2022	2022	62.00	---	25	---
Maryland Tier I Vintage 2023	2023	28.75	---	25	---
PJM Tri Qualified Vintage 2023	2023	28.75	---	25	---
PJM Tri Qualified Vintage 2023	2023	28.96	---	12	---
PJM Tri Qualified Vintage 2023	2023	28.92	---	10	---

PJM Tri Qualified Vintage 2023	2023	28.95	---	25	---
PJM Tri Qualified Vintage 2023	2023	28.89	---	25	---
PJM Tri Qualified Vintage 2023	2023	28.90	---	89	---
PJM Tri Qualified Vintage 2023	2023	0.00	Maryland Tier I 2023 Any	25	PJM 23 / MD 23 spr at \$0.00

Trade Log may contain Intercontinental Exchange data.

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