



Understanding the Water Futures market

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Chapter 1: The California Water Market

A. Overview

With nearly two-thirds of the world's population expected to face water shortages by 2025, water scarcity presents a growing climate-related risk for business and communities around the world.¹ Particularly in the state of California, the state's \$1.1 billion water market allocates a limited supply to the areas and users that need it most.²

In California's water market, buyers and sellers trade water through short-term, long-term, and permanent transfers of their water rights. Trading adds flexibility to the state's water allocation process. Short-term transfers lessen the economic impact of shortages during droughts by shifting water to uses and locations where the lack of water will be more costly. Long-term and permanent transfers accommodate geographic shifts in water demand as the economy changes and the population grows. Both surface water and groundwater are currently traded, and the water market is growing.³

A liquid, transparent futures market can help to create a forward curve so water users can hedge future price risk. A forward curve shows the prices at which it is possible to exchange commodities at points in the future for a price agreed today. Generally, the forward curve shows prices increasing as time goes on - a signal to the market that there is enough supply. However, the forward curve can also be inverted, meaning prices in the future are lower than prices today. An inverted forward curve signals to the market that a product is in short supply and there is significant demand. Prices are influenced by the state of the market today, expectations of the future, and the behavior and incentives of participants active in forward markets. For example, the Nasdaq Veles California Water Index Futures contract would allow an agricultural producer to plan ahead for changing costs of the water they need for large-scale irrigation. It would also allow a commercial end user, like a manufacturer, to better navigate business and financial risks when water prices fluctuate. Transparent forward pricing, visible through futures markets, has helped foster growth and efficiency in several major agricultural markets.

The charts below show a normal forward curve and an inverted forward curve for corn, a core commodity product. The structure of the curve will vary by product, and change over time, because of fundamental supply and demand factors.



Source: CME Group

¹ <https://www.un.org/waterforlifedecade/scarcity.shtml>

² <https://www.waterexchange.com/wp-content/uploads/2020/07/Q2-2020-Newsletter-Screen-3.pdf>

³ [PPIC: California's Water Market](#)

B. How is water transacted?

Water market transactions involve the temporary (i.e. lease) or permanent (i.e. sale) transfer of a wide range water entitlements. Water entitlements grant their owner the right to use defined amounts of water for specific purposes in certain locations. Commonly traded types of water entitlements in California include State Water Project (SWP) contracts, Central Valley Project (CVP) contracts, appropriative water rights, water stored underground ("banked" water), and adjudicated groundwater rights. In California and other areas of the western United States, water entitlements are quantified using acre-feet (AF). One AF is equal to the volume of water required to cover one acre of land (43,560 square feet) by a depth of one foot, equivalent to 325,851 gallons.

Water market participants can be grouped into three categories: Urban (Municipal/Industrial), Agricultural, and Environmental (NGOs/government agencies). Across the western states, the agricultural sector is the primary supplier of traded water transactions, accounting for approximately 67% of total volume sold over the last 10 years. The next largest stakeholder on the supply side are municipalities at 16%. On the demand side, municipalities are the largest buyer category with 44% of the total market, followed by environmental buyers at 26%, and the agricultural sector at 15%. Driven by expansion of higher valued specialty crops in California, the agricultural sector has seen the largest growth with total volume purchased doubling in the last 10 years.⁴

Water trading occurs in every western state, with more than 20 distinct regions where market activity routinely occurs. The largest markets are in Southern California, the Front Range of Colorado, and Central Texas near Austin and San Antonio. Of these, the California water market is the largest with almost four times the value and volume of water traded in other states.

C. Water market supply and demand

Supply

There are two main sources of supply to the California water market – surface water and groundwater. Around 75% of California's water supply originates north of Sacramento, while 80% of water demand is located south of the Sacramento-San Joaquin River Delta (Delta). To address this geographic imbalance between water supply and demand, California uses a combination of water storage and delivery systems to convey water from its origin in the north to demand in the south.⁵ These systems are a collection of interconnected reservoirs, aqueducts, and pumping plants that stretch almost the entire length of the state.

Within California the five largest and most actively traded regions, as shown in Figure 1, include:

- California's surface water market – which includes appropriative water rights, constitutes most of the tradeable water in California, and almost running the length of the entire state, this large network of water conveyance and storage infrastructure is supported by state, federal, and locally funded projects, including the Colorado River, the State Water Project (SWP), and the Central Valley Project (CVP).⁶ In particular, the SWP and CVP enable the conveyance of water transfers across a large region and vast distance as the majority of California's surface water resources originate north of the Delta, while the majority of water demand is located south of the Delta.

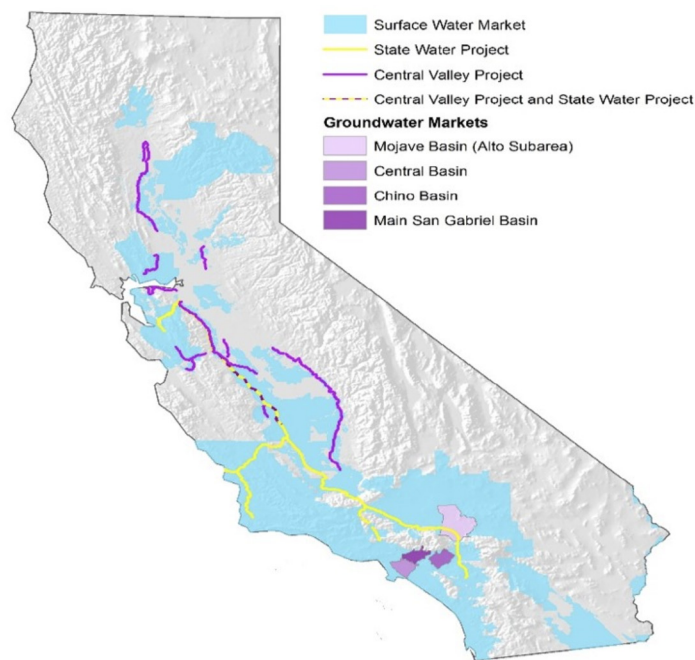
⁴ WestWater Research

⁵ <https://water.ca.gov/water-basics/the-california-water-system>

⁶ https://data.ers.usda.gov/reports.aspx?ID=17845#P1962f10d843041119cc91ef045a318f2_3_17iTOR0x5

- Groundwater markets
 - Central Basin – comprising 227 square miles in southern Los Angeles County, including portions of the cities of Los Angeles, Compton, East Los Angeles, Downey, and Norwalk.
 - Chino Basin – encompassing approximately 235 square miles of the upper Santa Ana River watershed and lies within portions of San Bernardino, Riverside, and Los Angeles counties. The cities of Chino, Ontario, Pomona, Jurupa Valley, and Fontana are located within the basin.
 - Main San Gabriel Basin – occupying 168 square miles mostly in San Gabriel Valley, and located in the southeast portion of Los Angeles County, including the cities of Claremont, Irwindale, Azusa, and West Covina.
 - Mojave Basin (Alto Subarea) – the Mojave Basin is comprised of five distinct but hydrologically interrelated “subareas,” the largest of which, Alto Subarea, encompasses 469 square miles in southwestern San Bernardino County and includes the populous cities of the area, Victorville, Apple Valley, and Hesperia.

Figure 1: California Water Markets and Infrastructure



Source: Nasdaq

Demand

The available water in California is used by three primary demand sectors – environmental, agricultural, and urban.⁷

50% goes to environmental uses

Environmental use includes natural water sources like rivers being protected by federal and state laws, water that supports existing habitats both within streams and creeks as well as within wetlands and wildlife preserves, and water that is needed to maintain water quality for other uses like agricultural and human consumption.

40% goes to agriculture

Agricultural use supports the largest agronomic producing U.S. state in terms of cash receipts. There are approximately nine million acres of irrigated farmland in California, and that acreage required 24.5 million acre-feet of water in 2018.⁸ Most agricultural water use occurs from June through September. Though agricultural production has increased with less intensive water inputs over the last few decades, the state has seen growth in tree and vine crops which need to be watered each year. In 2020, 1.26 million acres of California almonds produce approximately 80% of the global almond supply.⁹ According to USDA data, almonds are California's largest cash crop by receipt value and account for just over 10% of agricultural water use.^{10 11} The reliance on these types of agricultural products makes California farms more vulnerable to any water shortages. Additionally, as populations increase both locally and globally, there is more demand for crops grown in California.

10% is for urban use

Urban water use split between landscape watering and domestic use, such as water for toilets, showers, faucets, washing machines and other indoor uses. California's water resources need to support about 40 million inhabitants – a number expected to grow over the coming years. The strongest urban water demand is seen, like with the agricultural sector, in summer months. A recent focus on water shortages and development of water-saving technologies has resulted in a decline in per capita urban water usage. According to the Public Policy Institute of California (PPIC), a nonprofit-nonpartisan think tank, in 1990, per capita water use was 231 gallons per day, which decreased to 146 gallons per day by 2015. However, an expected increase in population clearly means more demand for water.¹²

7 <https://www.ppic.org/publication/water-use-in-california/#:~:text=Water%20in%20California%20is%20shared,between%20wet%20and%20dry%20years>

8 NASS: Irrigation and Water Management

9 https://www.capitalpress.com/ag_sectors/orchards_nuts_vines/almond-shipments-soar-to-all-time-high/article_a75fde5a-ce2c-11eb-88ed-c319e00be42c.html

10 https://data.ers.usda.gov/reports.aspx?ID=17845#P1962f10d84304119cc91ef045a318f2_3_17iT0R0x5

11 <https://sites.uci.edu/energyobserver/2015/04/21/california-water-usage-in-crops-and-the-water-value-of-almonds/>

12 PPIC: Water Use in California

Chapter 2: The Futures Market

A. What is a futures contract?

In 18th century Chicago, merchants and commodity sellers would meet on the street corners across the city to transact goods. This decentralized marketplace lacked transparency and made it difficult to determine a fair price for goods being bought and sold. In 1848, twelve businessmen established a gathering spot for buyers and sellers to meet and transact. Every time that a transaction occurred, its price was written on a chalkboard for the group to see. This was the inception of the Chicago Board of Trade and the first formal, centralized marketplace for agricultural futures contracts in the U.S.

A futures contract is an instrument that allows the marketplace to trade a specific quantity and quality of a given commodity at a specific expiry in the future. All terms of the contract are standardized except for the price, which is discovered via the supply (offers) and the demand (bids). This price discovery process occurs through an exchange's electronic trading system. All contracts are ultimately settled either through liquidation by an offsetting transaction (a purchase after an initial sale or a sale after an initial purchase), by delivery of the actual physical commodity, or by financial settlement. An offsetting transaction is the more frequently used method to settle a futures contract. Delivery usually occurs in less than 2 percent of all agricultural contracts traded.

B. What is CME Group's role?

The main economic functions of a futures exchange are price risk management and price discovery. An exchange accomplishes these functions by providing a facility and trading platforms that bring buyers and sellers together. An exchange also establishes and enforces rules to ensure that trading takes place in an open and competitive environment. For this reason, all bids and offers must be made either via the exchange's electronic order-entry trading system, such as CME Globex.

As a customer, you have the right to choose which trading platform you want your trades placed on. You can make electronic trades directly through your broker or through another entity/platform with pre-approval from your broker. Technically, all trades are ultimately made by a member of the exchange. If you are not a member, you will work through a commodity broker, who may be an exchange member or, if not, will in turn work with an exchange member. For more information on how to execute a trade, please see Chapter 5.

Market participants can access liquidity and price discovery through the Exchange with assurance that trades will be backed by CME Clearing. The benefits of a centrally cleared environment include:

- **Transparency:** Of market pricing, market metrics, risk management practices, and financial safeguards
- **Neutrality:** Neutral party to every transaction; neutral risk management standards
- **Security:** Performance bond system to secure positions and mitigate risk ex-ante
- **Daily mark-to-market** of cleared positions to remove risk ex-post
- **Forward price curve** to plan for and manage longer term price risk

C. Who participates in futures markets?

Futures market participants fall into the following general categories: hedgers, investors/speculators and market makers. Futures markets exist primarily for hedging, which is defined as the management of price risks inherent in the purchase or sale of commodities.

The word hedge means protection. The dictionary states that to hedge is “to try to avoid or lessen a loss by making counterbalancing investments ...” In the context of futures trading, that is precisely what a hedge is: a counterbalancing transaction involving a position in the futures market that is opposite one’s current position in the cash market. Since the cash market price and futures market price of a commodity tend to move up and down together, any loss or gain in the cash market will be roughly offset or counterbalanced in the futures market. Natural hedgers in the market are California water users, which includes municipalities, water districts, and businesses such as farmers or manufacturers. Financial institutions such as clearing firms may provide hedging services to market participants through market access and technical know-how.

In the world of commodities, a speculator is a party who typically does not handle the actual physical commodity but takes a financial position (long or short) with the expectation of profit from the move in the price of an asset. Speculators in commodities markets usually include hedge funds, proprietary trading firms, and individual traders. Additionally, investors such as asset managers, hedge funds and family offices seeking capital-efficient exposure to new or uncorrelated assets may use futures as their trading vehicle.

Market makers are trading firms that have contractually agreed to provide liquidity to the markets, continually providing both bids (an expression to buy) and offers (an expression to sell). Market makers seek to benefit from capturing spread, the small difference between the bid and offer prices over a large number of transactions, or by trading related markets that they view as being priced to provide opportunity.

Hedgers, investors/speculators and market makers are necessary for a healthy futures market. Hedgers are closely tied into a futures contract’s underlying physical market as the price of the commodity is a usually a core component of the firm’s business operations. This connection ensures that future prices accurately reflect market fundamentals and business conditions. Speculators provide additional liquidity to futures markets as they are willing to take both sides of a futures trade depending on their directional view of commodity prices while market makers, seeking to benefit from the bid/ask spread, assure that quotes are available throughout the trading day.

Chapter 3: Water Futures

A. Contract specifications

In December 2020, CME Group launched the Nasdaq Veles California Water Index Futures (CME Group Code: H2O, or "Water Futures"), a financially settled futures contract that allows traders to manage their exposure to water price fluctuation. The Nasdaq Veles California Water Index (NQH2O) has been published since the fall of 2018 and reflects the cash price of water in California at its source.

The contract specifications were developed in consultation with participants in the water industry, as well as Nasdaq, Veles Water, and WestWater Research. Each contract represents 10 acre feet of water and can trade in increments of \$1 per acre foot. Participants are able to trade quarterly expirations, as well as the nearest two serial months, allowing for a variety of strategies to cover exposure. The CME water market is traded on the screen (Globex) 23 hours per day. Further contract specifications can be found below, or at [this link](#).

NASDAQ VELES CALIFORNIA WATER INDEX FUTURES CONTRACT SPECS	
CONTRACT TITLE	Nasdaq Veles California Water Index Futures
RULEBOOK CHAPTER	CME 417
CONTRACT UNIT	10 acre feet times Nasdaq Veles California Water Index (NQH2O)
MINIMUM PRICE FLUCTUATION	\$1.00 per acre foot (\$10 per contract) in outrights \$0.25 per acre foot (\$2.50 per contract) in calendar spreads
COMMODITY CODE	CME Globex: H2O CME ClearPort: H2O Clearing: H2O
LISTING SCHEDULE	Eight consecutive quarterly contracts (Mar, Jun, Sept, Dec) plus nearest two non-quarterly serial months
TERMINATION OF TRADING	Business Day prior to Final Settlement Day
SETTLEMENT METHOD	Financial
FINAL SETTLEMENT	Third Wednesday of the contract month if a CME Business Day, otherwise the next CME Business Day
CME GLOBEX MATCHING ALGORITHM	First In First Out (FIFO)
BLOCK TRADE MINIMUM THRESHOLD	25 contracts – subject to a 15-minute reporting window
TRADING AND CLEARING HOURS	CME Globex: 5:00 p.m. - 4:00 p.m. Central Time (CT) Sunday - Friday CME Globex Pre-Open: Monday - Friday 8:30 a.m. – 9:00 a.m. CT CME ClearPort: Sunday 5:00 p.m. - Friday 5:45 p.m. CT with a 15-minute maintenance window Monday - Thursday from 5:45 p.m. to 6:00 p.m. CT

B. Financial settlement

Cash Settlement vs. Physical Delivery

In contracts with physical delivery, the underlying physical market is inherently tied to the futures contract through the delivery mechanism. During the delivery period and/or at contract expiration, any entity with open positions will be matched with an entity or entities with opposite positions, and the process of physical delivery begins. Eventually, the commodity or a certificate legally representing the commodity will change hands between the maker of delivery and the taker of delivery. Any entity holding a long position after the close on first position day is eligible to be matched for delivery, and every entity with a position after expiration will need to deal with the delivery process.

On the other hand, cash-settled contracts are not physically tied to the underlying commodity. At expiry, a final settlement price is determined, and each entity is either owed money or pays money to settle their position. No one involved in the futures market is at risk of being compelled to make or take delivery of a physical product.

Final Settlement & The Role of Price Reporting Agencies

Final settlement is the price used by both the buyer (long) and the seller (short) to ultimately terminate a contract. In physical delivery, it represents the invoice price at which the commodity will be sold and change hands. In cash-settlement, it is the price to which all financial obligations will be marked.

In most physically delivered contracts, the final settlement price that will be used to determine the price at which the commodity will change hands is derived in nearly the same way as daily settlement – a volume weighted average price calculated during a short settlement period on the day of expiry. In cash-settled contracts, a Price Reporting Agency ("PRA") or some other index provider is necessary to determine final settlement. The role of the PRA or index provider is to combine data on underlying cash transactions, bids, and offers along with their knowledge of the market to come up with a price assessment – either daily or weekly – for a given commodity. The Exchange may then employ calculations, which differ by commodity, to turn these assessments into final settlement prices.

For the Nasdaq Veles California Water Index futures contract, the final settlement is the Nasdaq Veles California Water Index (NQH2O) price published on the third Wednesday of each contract month. The price disseminated by Nasdaq seeks to track the spot rate price of water rights in the state of California and takes into account all verified and approved transactions of water rights among relevant surface water and adjudicated basins over the prior week. Nasdaq uses a volume-weighted average price index methodology, whereby transactions are capitalized to a twelve-month lease value and normalized to a geographic average to adjust for idiosyncratic pricing factors specific to eligible markets and transactions. More information on the calculation of the Nasdaq Veles California Water Index can be found below.

Index providers and price reporting agencies play a vital role in derivatives markets. Any entity chosen to supply assessments that underlie a final settlement price must be thoroughly trusted by the industry. Final settlement prices distributed by the Exchange using external data represent the final valuation of a commodity for the entire marketplace. The Exchange puts serious consideration into the index providers and PRAs that it works with; customer validation is continually conducted to assure index providers retain the highest confidence within the industry.

Benefits of Cash Settlement

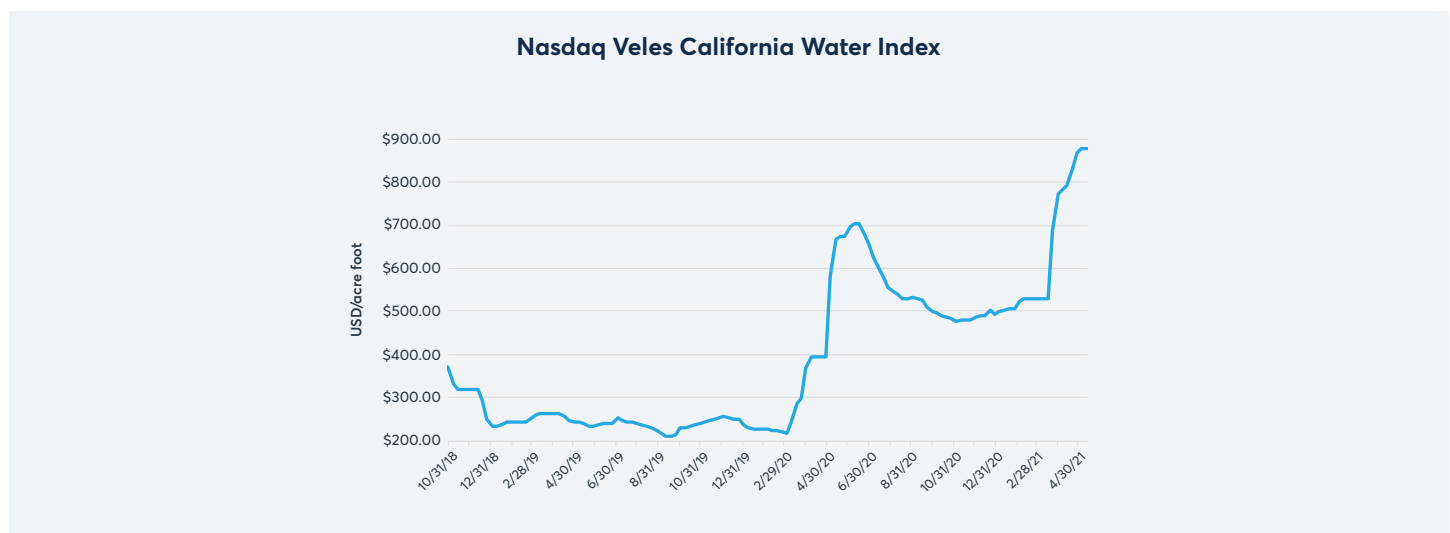
There are strengths and weaknesses with both physical delivery and cash settlement. Each commodity market is unique, and contracts should be developed to suit the specific needs of that given market. That said, there are several benefits afforded by cash settlement.

With cash settlement, traders can participate in the expiration of a contract without the consideration of any aspects of physical delivery. It facilitates speculation near contract expiration since liquidity providers need not be concerned with notice days and delivery timing. Additionally, any market participant within a commodity's value chain can hedge their risk without concern over physical delivery. Cash settlement allows a greater number of entities to participate late into a contract's life because the end result is purely a financial exchange rather than optionality on a physical commodity.

Numerous academic studies have shown that cash settled futures contracts benefit the underlying cash commodity market. These studies suggest cash settlement leads to decline in futures volatility, a decline in volatility of volatility, an increase basis stability, and ultimately have no effect on the spot market. The latter point is crucial to the water market, as it should allay any concerns that the development of a futures market will drive up the cash prices of water.

C. Nasdaq Veles California Water Index

The new Nasdaq Veles California Water Index Futures (CME Group Code: H2O, "Water Futures") contract is financially settled based on the Nasdaq Veles California Water Index (NQH2O). The index sets a weekly benchmark spot price of water rights in California. Nasdaq launched the NQH2O Index in 2018 in partnership with Veles Water Limited, a firm specializing in the development of financial products for water markets. Veles formulated the original index concept and collaborated with Nasdaq in developing the NQH2O methodology. The data utilized in the calculation of the index is provided by WestWater Research, an economic consulting firm focused on pricing, valuation, and transaction advisory services for water rights and water resource development.



Source: Nasdaq NQH2O

NQH2O Data Collection and Screening

The Nasdaq Veles California Water Index (NQH2O) derives its value from California water transactions data provided by WestWater Research. WestWater collects and screens permanent and temporary water transfers for entry in its proprietary database (Waterlitix™). Data on water transfers meeting the criteria for inclusion in NQH2O are then delivered to Nasdaq for Index calculation. The process for collecting and screening water transfers data is:

1. **Identify Transactions:** Meeting agendas and regulatory filings of private, local, state, and federal agencies are systematically reviewed to identify water transfers. Water transfers are also identified through routine correspondence with water market participants and regulators.
2. **Discover Transaction Details:** WestWater contacts the parties to identified transfers to ascertain details such as price, volume, and buyer/seller motivations, and to request supporting documents like purchase and sale agreements. Transfers are closely tracked throughout the agreement completion and regulatory approval processes. Buyers, sellers, market regulators, attorneys, brokers, and other intermediaries are contacted regularly to discover and confirm transfer details.
3. **Confirm Transaction Completion:** A water transfer is determined to be complete when both of the following are true:
 - a. A purchase and sale agreement or other definitive documentation has been fully executed by the transacting parties.
 - b. The transaction has received every necessary approval for the transfer of water to occur. Depending upon the nature of the transfer, state, federal, and/or local agencies may be involved in approving a water transfer.
4. **NQH2O Inclusion Criteria:** Completed transfers are included in the NQH2O if each of the following is true:
 - a. The price, volume, and completion date have been confirmed through supporting documentation and correspondence with the buyer and/or seller.
 - b. The transaction is between unrelated parties.
 - c. The transaction price is a result of market-based negotiations.
 - d. The transaction is between one or more parties located within the region supplied by the State Water Project (SWP), Central Valley Project (CVP), or Boulder Canyon Project (BCP).
 - e. The transaction involves surface water from the SWP, CVP, BCP, or appropriative rights, or groundwater from the Central Valley, Main San Gabriel Basin, Mojave Basin, Chino Basin, or Central Basin.
 - f. If the transaction is part of a multi-year agreement, then the price must be based on a hydrologic indicator which varies annually or be renegotiated annually.
5. **Nasdaq Reporting:** Every Monday, transfers completed during the prior week that meet the NQH2O inclusion criteria are reported to Nasdaq for Index calculation. The information reported to Nasdaq includes the volume-weighted average price, total volume traded, and total number of transactions for each of the following types of transfers:
 - a. Main San Gabriel Basin – Leases
 - b. Main San Gabriel Basin – Sales
 - c. Central Basin – Leases
 - d. Central Basin – Sales
 - e. Chino Basin – Leases

- f. Chino Basin – Sales
- g. Mojave Basin (Alto Subarea) – Leases
- h. Mojave Basin (Alto Subarea) – Sales
- i. Surface Water – Spot Market Leases – South-of-Delta to South-of-Delta (SOD-SOD)
- j. Surface Water – Spot Market Leases – North-of-Delta to North-of-Delta (NOD-NOD)
- k. Surface Water – Spot Market Leases – North-of-Delta to South-of-Delta (NOD-SOD)
- l. Surface Water – Multi-Year Leases – Variable – SOD-SOD
- m. Surface Water – Multi-Year Leases – Variable – NOD-NOD
- n. Surface Water – Multi-Year Leases – Variable – NOD-SOD
- o. Surface Water – Sales

For single-year transfers and permanent transfers with one-time payments, the later date of agreement execution or final approval is the Nasdaq report date. For multi-year agreements providing water deliveries to buyers and water payments to sellers for a specified number of years, the annual water payment dates are the Nasdaq report dates.

NQH2O methodology

The Nasdaq Veles California Water Index (NQH2O) seeks to track the spot rate price of water in the state of California. The Index represents the current valuation of water as determined by water entitlement transactions from the state of California's surface water market and the four most actively traded adjudicated groundwater basins.¹³ In particular, the Index considers surface water transfers conducted within the region supplied by the State Water Project (SWP), the Central Valley Project (CVP), and the Colorado River, as well as groundwater transfers from the Central Basin, Chino Basin, Main San Gabriel Basin, and Mojave Basin.

The Index is based on actual transactions from major regulated surface water and groundwater sources. The transaction data used to calculate the Index is provided to Nasdaq by WestWater Research. This data is anonymized, meaning that Nasdaq is only privy to volumes and prices of a transaction. The identities of the parties involved are unknown to Nasdaq. Each transaction is confirmed and verified by WestWater prior to its inclusion in the data that is reported to Nasdaq. WestWater only reports a transaction to Nasdaq once it has been approved by the relevant regulatory authorities and fully consummated by the counterparties.

The Index is priced in dollars per acre feet¹⁴ and is published weekly on Wednesday morning at 9:30 AM ET. The Index value reflects all eligible transaction price data through the end of the prior week. For example, the Index value of \$371.11 per acre feet on October 31, 2018 is a representative value of the adjusted weighted-average price of qualified water transfers from Monday, October 22, 2018 through Friday, October 26, 2018.

The Index uses a modified volume-weighted average price methodology. Prior to calculating the volume-weighted average price, the Index methodology adjusts the reported volumes and prices of certain transactions. While many factors affect the price of all eligible transactions in a similar fashion, there are some systematic factors that impact the pricing of water in specific markets within California. These factors are material and persistent phenomena.

¹³ Adjudicated basins have court judgements that establish groundwater rights. In addition to identifying water rights owners, the adjudication process establishes rules and procedures for extracting water from the basin.

¹⁴ An acre foot is equal to the volume of water required to cover one acre of land (43,560 square feet) by a depth of one foot, equivalent to 325,851 gallons.

The Index aims to address these factors by adjusting the price and volumes of the impacted transactions. These adjustments seek to minimize the impact of price variation that is attributable to such idiosyncrasies while preserving that variation which is attributable to changes in the spot market value of water rights.

Adjustments made to the reported transaction data are entirely rules-based. There is no discretion or subjectivity involved in the adjustment of a transaction reported by WestWater to Nasdaq. Some examples of adjustments include the following:

- In the case of permanent transfers, the value of those transactions is capitalized¹⁵ to a twelve-month lease value. This adjustment is calculated for each of the surface water market and the four adjudicated groundwater basins based on the prevailing price difference between lease and sale transactions within the given market.
- Each of the surface water market and the four adjudicated groundwater basins trades at a prevailing range of prices. While these markets move in similar direction and magnitude in response to changing supply and demand conditions, each market trades at a persistent premium or discount relative to the others. This is particularly true for the adjudicated groundwater basins. Without adjustments to account for such differences, the Index would be prone to abrupt increases or decreases that are reflective of these differences rather than material changes in the spot value of water. Thus, the Index calculates adjustment factors for each market that reflect market's premium or discount relative to the volume weighted average price of all eligible transactions.
- Within the surface water market, the location of buyer and seller materially impacts the price of the given transaction. Thus, surface water market transactions are segmented on the basis of the location of the buyer and seller with respect to the Sacramento-San Joaquin River Delta. Within these segments, the Index calculates an adjustment factor for each segment that reflect the observed discount or premium of the volume weighted average price of that segment relative to the volume weighted average price of all eligible transactions within the surface water market. In the event a surface water transaction is subject to Delta Carriage Losses,¹⁶ the Index reduces the volume of the transaction by the loss factor and increases the price by the reciprocal value.

How does NQH2O differentiate itself from other water indexes? Why is NQH2O unique? What does the index represent?

Prior to NQH2O, water indexes typically reflected the stock price performance of a portfolio of water companies. The value of a stock can change for many different reasons, but the stock price is reflective of the market's value of equity ownership in the company itself. It's important to note that stocks are often highly correlated to broad equity benchmarks such as the S&P 500 Index. An individual stock may be more sensitive or less sensitive to a movement in the benchmark index, but most stocks move in a similar fashion to that benchmark. As such, an index comprised of the stocks of water companies will perform similarly to other stock indexes. In other words, a change in the value of stock-based water index is more likely to reflect a change in the value of the S&P 500 Index than a change in the spot market value of water.

¹⁵ Capitalizing a lease value is an accounting approach which takes into consideration appreciation/depreciation of an asset, with the asset value on the balance sheet being the lesser of the fair market value or the present value of the lease payments. This capitalization is applied to permanent sale and multi-year lease transactions, which allows the price of these transactions to be normalized to a one-year lease value

¹⁶ Carriage water is the additional flow necessary to move transfer water across the Delta for export so as not to exceed the objectives contained in D-1641. DWR and USBR estimate carriage water based on annual hydrology, Project operations and regulatory restrictions among other operational considerations. Carriage water losses are applied to the quantity of transfer water made available above the Delta. This reduces the quantity of water that is actually exported from the Delta.

The NQH2O Index is unlike any water index that has come before it. Changes in the value of other financial assets such as stocks have no bearing on changes to NQH2O. The Index provides a transparent spot market value of water as determined by market-based transactions. The Index value is a result of buyers and sellers discerning a fair value for water as of a particular point in time. Holding all else equal, as the supply of water becomes increasingly scarce, the price of the Index will rise; as the supply of water becomes more plentiful, the value of the Index will fall. Thus, the Index is a measure of the relative scarcity of water in the state of California.

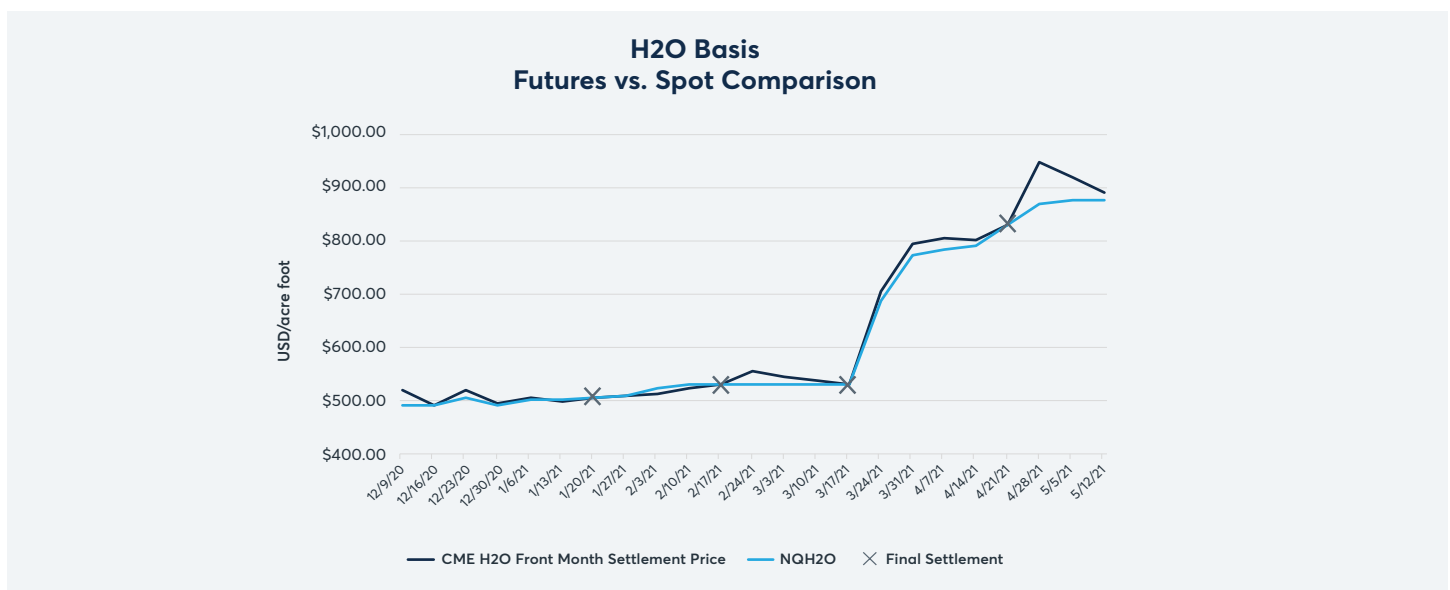
Why should naturals and 'others' care?

California water resources are characterized by their extremely variable supply. The price of water can increase sharply during drought conditions, as demand substantially outpaces supply. The inverse holds true when the state experiences sustained wet hydrologic conditions. Over the last century, California has experienced several prolonged and severe drought cycles, punctuated by brief periods of extremely wet hydrologic conditions. Whether one is a buyer or seller, the impact of water price volatility can be profound for naturals. In addition to hydrologically-driven challenges, the information available to water market participants is often limited and opaque. Buyers and sellers may only be aware of trades in their local market, and even then, the pricing of those trades is rarely disclosed publicly.

NQH2O represents a real-time indicator of fair value that is both comprehensive and timely. The current Index value informs naturals of current market conditions, and the historical values offer a means of understanding the relationship between spot market prices and key indicators of relative scarcity in the California water market. By understanding these historical relationships, naturals can potentially develop a viewpoint of future spot market prices based on their assumptions of where those same key indicators will be at a particular time.

Chapter 4: Hedging With Water Futures And Basis

CME Water Futures allows those with cash water exposure to take a position that effectively "locks in" the price of water. What enables this protection is that Water Futures and cash water prices – as expressed by the NQH2O – are highly correlated and move together. This means that, generally, the futures price will rise as the cash price rises, and the futures price will fall as the cash price falls. Therefore, losses in the cash market can be offset by gains in the futures market. The converse is also true – losses in the futures market can be offset by gains in the cash market.



A. The Short Hedge

Natural sellers of water – a holder of water rights, for example – are adversely impacted when the price of water goes down over time. The Water Futures market offers a protection against falling prices in the form of a short futures position.

Short hedge example

	CASH MARKET	FUTURES MARKET
6/24/2020	Cash water is \$676/af	Sell December H2O futures at \$670/af
11/4/2020	Cash water is \$476/af	Buy December H2O futures at \$475/af
CHANGE	\$200/af Loss	\$195/af Gain
	Sell cash Water at:	\$476/af
	Gain on futures:	\$195/af
	Net sales price:	\$671/af

From June through November 2020, cash water prices decreased significantly. Sellers of water were subject to this fall in water prices, and faced receiving about \$200 less per acre foot than they would have just months ago. Any sellers, however, who hedged their exposure using CME Water Futures, could have mitigated that risk.¹⁷ For example, NQH2O was \$676 per acre foot on June 24, 2020 and fell to \$476 per acre foot on November 4, 2020. An unhedged seller of water lost \$200 per acre foot over that five-month span, and as a result faced significantly lower prices. However, if a cash seller of water (a short hedger) sold December Water Futures at \$670 per acre foot in June, and bought that position in November at \$475 per acre foot, they would experience a gain of \$195 per acre foot. Therefore, while that cash seller would be receiving a lower price in the cash market, their futures gain helped to mitigate that loss. The water seller would be receiving only \$476 per acre foot in the cash market in November, but their \$195 per acre foot gain in futures means that the effective price the seller is receiving for water is \$671 per acre foot.

B. The Long Hedge

Natural buyers of water – agricultural cooperatives, large scale farming operations with irrigation systems, or municipalities – are adversely impacted when the price of water goes up over time. The Water Futures market offers a protection against rising prices in the form of a long futures position.

Long hedge example

	CASH MARKET	FUTURES MARKET
12/16/2020	Cash water is \$489/af	Buy May H2O futures at \$500/af
5/12/2021	Cash water is \$877/af	Sell May H2O futures at \$892/af
CHANGE	\$388/af Loss	\$392/af Gain
	Buy cash Water at:	\$877/af
	Gain on futures:	\$392/af
	Net purchase price:	\$485/af

¹⁷ Water Futures were not yet launched, but this period was chosen to illustrate falling water prices.

From December 2020 through May 2021, cash water prices increased dramatically. Buyers of water have been subject to this rise in water prices, and faced paying over \$350 more per acre foot than they would have just months ago. Any buyers, however, who hedged their exposure using CME Water Futures, could have mitigated this risk. For example, NQH2O was \$489 per acre foot on December 16, 2020 and climbed to \$877 per acre foot on May 12, 2021. An unhedged buyer of water lost \$388 per acre foot over that five-month span, and as a result faced significantly higher prices. However, if a cash buyer of water (a long hedger) bought May Water Futures at \$500 per acre foot in December, and sold that position in May at \$892 per acre foot (the Water Futures settlement price on May 12, 2021), they would experience a gain of \$392 per acre foot. Therefore, while that cash buyer would be paying a higher price in the cash market, their futures gain helped to mitigate that loss. The water buyer would be paying \$877 per acre foot in the cash market in May, but their \$392 per acre foot gain in futures means that the effective price the buyer is paying for water is \$485 per acre foot.

C. Basis: the link between cash and futures prices

The hedging examples above show how an entity with exposure to cash water price fluctuation could hedge their risk. However, both examples assume a cash price very close to the NQH2O, which, as shown, is very highly correlated with Water Futures prices. Regional cash prices – both in California and around the country – may not be perfectly reflected by the NQH2O, even though a relationship exists. Essentially, the regional cash price for water is the futures price adjusted for local supply and demand factors. The price difference between the cash and futures prices may be slight or it may be substantial, and the two prices may not always vary by the same amount. This price difference (cash price – futures price) is known as the basis.

A basis can be positive or negative, and in the commodities markets is defined as cash price minus futures price. For example, a regional cash price for water may be \$600 per acre foot while Water Futures is pricing around \$700 per acre foot. In this scenario, the basis would be - \$100, or \$100 under futures. Conversely, a regional cash price for water may be \$900 per acre foot while Water Futures is pricing around \$700 per acre foot. In this case, the basis would be \$200, or \$200 over futures.

Basis can strengthen or weaken depending on a variety of factors. A strengthening basis means cash prices are getting higher relative to futures prices, whereas a weakening basis means cash prices are getting lower relative to futures prices. Whether your position is as a short hedger or a long hedger, you can benefit from a move in the basis. Because short hedgers have exposure to price decreases, a strengthening of the basis (i.e. a strong cash price relative to futures) while holding a position is beneficial. The below example shows cash and futures prices decreasing over time, combined with a strengthening of the basis from \$170 under to \$150 under.

	CASH MARKET	FUTURES MARKET	BASIS
6/24/2020	Cash water is \$500/af	Sell December H2O futures at \$670/af	\$170 Under
11/4/2020	Cash water is \$325/af	Buy December H2O futures at \$475/af	\$150 Under
CHANGE	\$175/af Loss	\$195/af Gain	\$20 Gain
	Sell cash Water at:		\$325/af
	Gain on futures:		\$195/af
	Net sales price:		\$520/af

As shown above, the futures market protected the seller against adverse price movements, and the basis moved in favor of the short hedger. Without the basis move, the short hedger would have exactly offset the cash market loss with a gain in futures. However, the strengthening of the basis made this position more valuable.

The converse situation is true for long hedgers: a buyer of water has risk of increasing water prices, so a weakening of the basis (i.e. a weaker cash price relative to futures) while holding a position results in a better outcome. The following hypothetical example illustrates an increase in both futures and cash prices, in conjunction with a weakening of the basis from \$50 over to \$40 over.

Gain in Futures

	CASH MARKET	FUTURES MARKET	BASIS
12/16/2020	Region A Cash water is \$550/af	Buy May H2O futures at \$500/af	\$50 Over
5/12/2021	Region A Cash water is \$932/af	Sell May H2O futures at \$892/af	\$40 Over
CHANGE	\$382/af Loss	\$392/af Gain	\$10 Gain
	Buy cash Water at:		\$932/af
	Gain on futures:		\$392/af
	Net purchase price:		\$540/af

Understanding basis and basis exposure is key to hedging water exposure. By hedging with futures, buyers and sellers are removing price level risk, but taking on basis level risk. Although it is true that basis risk is relatively less than the risk associated with either cash market prices or futures market prices, it is still a market risk. However, hedgers can do something to manage their basis risk: understand historical basis for patterns. Understanding how your basis changes with supply and demand dynamics, or how seasonality impacts your basis, is the key to mitigating basis risk. As CME Water Futures are relatively new, NQH2O can be used as a reasonably proxy for calculating historical basis.

Chapter 5: Logistics of Trading Water Futures

A. Accessing the contract

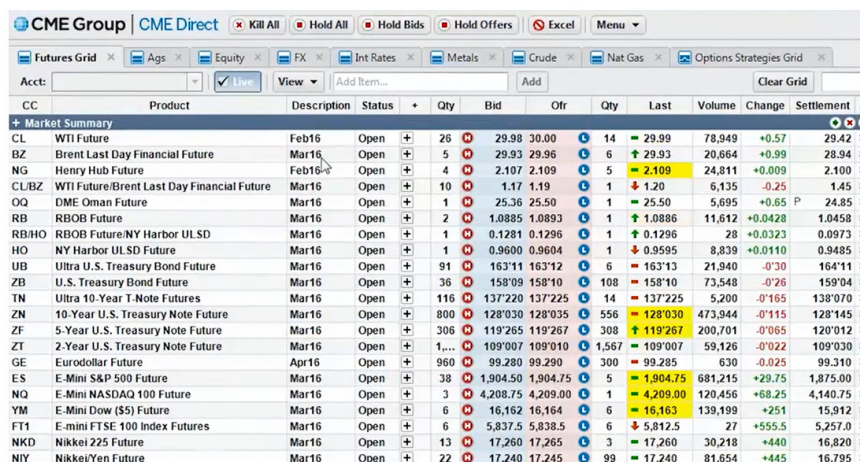
1. **Open an account** – In order to trade H2O futures, find a registered futures broker or introducing broker who offers access to the contract. A list of such brokers may be found [here](#). Many securities brokers are also registered to deal in futures. You may want to see if your current broker can provide you with this service. Working with a knowledgeable broker and quality firm can play an important role in your long-term success. Contact several brokers until you find the right combination of cost and service.
 - a. Brokers or futures commission merchants (FCMs), provide clearing and execution services, maintain your account and guarantee your trades. Additionally, a broker can answer questions you will inevitably have, keep you posted on new developments, and alert you to specific opportunities that may be worth your consideration.
 - b. Brokers may require a minimum deposit before you can trade. Such deposits are maintained in segregated customer accounts.

2. Trade - CME Group's open and transparent electronic marketplace, Globex, provides investors with price discovery and allows them to easily buy or sell water futures. Access to actionable quotes is available through:

- Broker provided trading platforms – Access the market through a front-end platform that is best suited for your trading needs whether you're a hedger or active trader. In addition to connecting you to the Globex central limit order book where you can see real-time price data, brokers can provide platforms that offer enhanced features and analytics to help you make more informed decisions. See water futures ticker codes, below, for popular trading platforms:

CME GLOBEX	H2O
BLOOMBERG	Futures: HOOA <Index> Spreads: HOOHOO <Index>
REFINITIV GLOBEX RIC ROOT	1H2O
REFINITIV COMPOSITE RIC ROOT	H2O
TT	H2O
CQG	H2O
DTN	@H2O
FIDESSA	H2O
FIS GLOBAL	H2O
ION (PATS & FFASTFILL)	H2O
ITIVITI (ORC & TBRICKS)	H2O

- CME Direct (CMED) – Available through most clearing firms, CMED is a one-stop, highly-configurable trading platform to access all CME futures and options contracts. The platform allows access to both CME Globex (our electronic central limit orderbook) and CME ClearPort (for submission of blocks and exchange for physical transactions) with a single interface. Benefit from the deep liquidity and transparency of CME Group markets and uncover new trading opportunities. For further registration instructions, learn more [here](#).



CC	Product	Description	Status	Qty	Bid	Offer	Qty	Last	Volume	Change	Settlement
CL	WTI Future	Feb16	Open	26	29.98	30.00	14	29.99	78,949	+0.57	29.42
BZ	Brent Last Day Financial Future	Mar16	Open	5	29.93	29.96	6	29.93	20,664	+0.99	28.94
NG	Henry Hub Future	Feb16	Open	4	2.107	2.109	5	2.109	24,811	+0.009	2.100
CLBZ	WTI Future/Brent Last Day Financial Future	Mar16	Open	10	1.17	1.19	1	1.20	6,135	-0.25	1.45
OQ	DME Oman Future	Mar16	Open	1	25.36	25.50	1	25.50	5,695	+0.65	24.85
RB	RBOB Future	Mar16	Open	2	1.0885	1.0893	1	1.0886	11,612	+0.0428	1.0458
RBHO	RBOB Future/WTI Harbor ULSD	Mar16	Open	1	0.1281	0.1296	1	0.1296	28	+0.0323	0.0973
HO	NY Harbor ULSD Future	Mar16	Open	1	0.9600	0.9604	1	0.9595	8,839	-0.70	0.9485
UB	Ultra U.S. Treasury Bond Future	Mar16	Open	91	163.11	163.12	6	163.13	21,940	-0.70	164.11
ZB	U.S. Treasury Bond Future	Mar16	Open	36	158.09	158.10	108	158.10	73,548	-0.26	159.04
TN	Ultra 10-Year T-Note Futures	Mar16	Open	116	137.220	137.225	14	137.225	5,200	-0.165	138.070
ZN	10-Year U.S. Treasury Note Future	Mar16	Open	800	128.030	128.035	556	128.030	473,844	-0.115	128.145
ZF	5-Year U.S. Treasury Note Future	Mar16	Open	306	119.265	119.267	308	119.267	200,701	-0.065	120.012
ZT	2-Year U.S. Treasury Note Future	Mar16	Open	1,...	109.007	109.010	1,567	109.007	59,126	-0.022	109.030
GE	Eurodollar Future	Apr16	Open	960	99.280	99.290	300	99.285	530	-0.025	99.310
ES	E-Mini S&P 500 Future	Mar16	Open	38	1,904.50	1,904.75	5	1,904.75	681,215	+29.75	1,875.00
NQ	E-Mini NASDAQ 100 Future	Mar16	Open	3	4,208.75	4,209.00	1	4,209.00	120,456	+68.25	4,140.75
YM	E-Mini Dow (\$5) Future	Mar16	Open	6	16,162	16,164	6	16,163	139,199	+251	15,912
FT1	E-mini FTSE 100 Index Futures	Mar16	Open	6	5,837.5	5,838.5	6	5,812.5	27	+555.5	5,257.0
NKD	Nikkei 225 Future	Mar16	Open	13	17,260	17,265	3	17,260	30,218	+440	16,820
NIY	Nikkei Yen Future	Mar16	Open	22	17,240	17,245	99	17,240	81,654	+445	16,795

In addition to trading water futures anonymously on an electronic trading platform, market participants may also negotiate the contracts bilaterally through block and exchange for physical (EFP) transactions.

Blocks – Water futures are [block trade eligible](#), subject to [Rule 526](#), with a minimum block threshold level of 25 contracts. Blocks are bilateral, privately negotiated transactions between Eligible Contract Participants (as defined in Section 1a(18) of the Commodity Exchange Act) traded apart from the public auction market. Block trades may be executed at any time at a fair and reasonable price and must be submitted to CME Clearing within a prescribed time after execution. Blocks may be submitted to the exchange via CME Direct.

Fair and reasonable price is determined by the following:

- Size of the transaction
- Prices and sizes of other transactions in the same contract at the relevant time
- Prices and sizes of transactions in other relevant markets, including, without limitation, the underlying spot market or related futures markets, at the relevant time
- Circumstances of the markets or the parties to the block trade

EFP – An Exchange for Physical transaction may be used for Water futures in accordance with [Rule 538](#). EFP transactions are privately negotiated trades between two counterparties allowing them to simultaneously transfer a futures position for an equivalent spot market position or vice versa. In the case of water futures, an equivalent spot market position may be an exchange of water rights or related ETF (Exchange Traded Fund) [Learn more here](#).

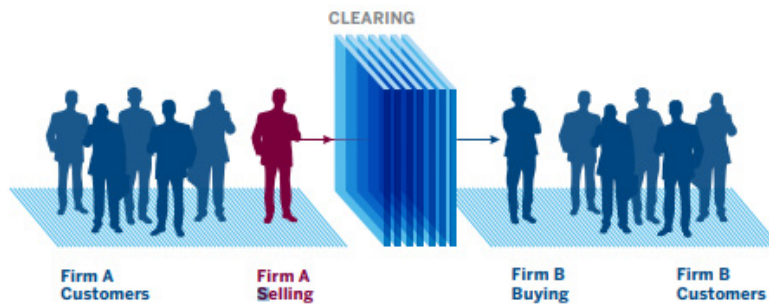
B. Financial safeguards

CME Clearing, which is owned by CME Group, provides industry-leading financial integrity that is the standard for making markets more efficient. CME Clearing is responsible for settling trading accounts, clearing trades, collecting and maintaining performance bond funds, regulating delivery, facilitating the option exercise process and reporting trade data.

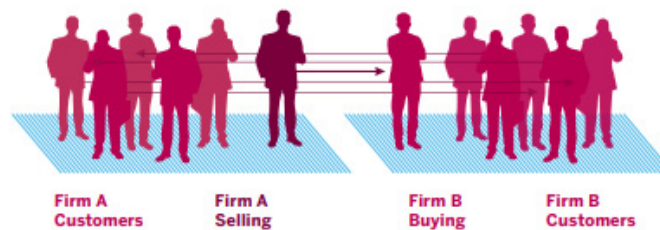
The presence of a central counterparty like CME Clearing is an important advantage of futures compared to over-the-counter alternatives. Over-the-counter transactions are made between two private parties with no central clearing counterparty to extend credit or assure performance of the agreement. This leaves participants at risk for a potential default of the other party, which translates into increased capital requirements, credit inefficiencies and higher overall credit risk.

By serving as the counterparty to every transaction, CME Clearing becomes the buyer to every seller and the seller to every buyer, substantially reducing the financial performance risk of each market participant's position in CME Group products. Further, by marking positions to market twice each day, CME Clearing helps to eliminate the accumulation of losses or debt. This helps individual customers manage their risk and also helps contain risk for the market as a whole.

CENTRAL COUNTERPARTY CLEARING MODEL



BILATERAL MODEL



C. Margin

One of the benefits of using futures is the leverage they offer. For example, buyers and sellers of a futures contract post performance bonds also known as margin to secure their long or short position and ensure performance according to the contract terms. These deposits are collected by the client's clearing firm, held in segregated customer accounts and posted to the CME Clearinghouse. The required exchange minimum margin for a particular contract may represent a fraction of the notional total value of the contract providing the user with greater flexibility and capital efficiency. In the case of Nasdaq Veles California Water Index futures (H2O), the required maintenance margin, as of May 31, 2021, is \$1,500 per contract. With the notional value of the contract, on that day, representing \$9,130 (contract size (10 af) x H2O settlement price (\$913))¹⁸, maintenance margin would be about 16% thus offering the buyer or seller of the contract 6x leverage.

CME Clearing uses a SPAN (Standard Portfolio Analysis of Risk) model and considers a vast array of inputs, including historical volatility data, annual or seasonal patterns, recent or anticipated events and changes in market dynamics to determine a contract's margin requirements. There two different kinds of margin that a market participant should be aware of:

- Initial margin is the up-front deposit, a percentage of the trade price, made prior to a market transaction.
- Maintenance margin is the minimum deposit that the market participant is required hold in their account. After the initial margin is met, a market participant is required to keep up their maintenance margin. This is the amount of equity required to retain an open position. If subsequently margin equity falls below the maintenance margin amount, a call must be issued to bring the account up to initial margin.

¹⁸ The customer's clearing firm may require additional margin

The initial margin requirement may be 110% or 100% of maintenance margin depending on the client's business, their anticipated use of the contract (for example, hedging, speculating, etc.) and the results of the clearing firm's credit analysis. FCMs will classify clients as having a Heightened Risk Profile ("HRP") or Non-Heightened Risk Profile ("Non-HRP"). Initial margin for an HRP customer is 110% of the maintenance margin requirement while for a Non-HRP customer the initial margin requirement is set at 100% of the maintenance margin requirement.

As prices change throughout the life of a futures contract, the trading accounts where performance bonds (margin) are held are debited and credited accordingly on a daily basis. Learn more about margins:

FAQ: <https://www.cmegroup.com/clearing/cme-clearing-overview/performance-bonds.html>

SPAN: <https://www.cmegroup.com/clearing/files/span-methodology.pdf>

CME Group notifies the public of margin changes through our [Advisory service](#).

D. Mark-To-Market

CME Group staff determines the daily settlements for H2O contracts based on H2O trading activity on CME Globex between 14:55:00 and 15:00:00 Central Time (CT), the settlement period. The settlement price is used in the daily mark-to-market (MTM) process to determine daily futures profit and loss. Once a futures contract's daily settlement price is established, the customer's FCM calculates the daily profit/loss, and, if required, margin adjustments are made. In the futures markets, accounts are credited (gains) and debited (losses) every day ensuring all accounts are balanced. The dollar difference from the previous day's settlement price to the current day's settlement price determines the profit or loss. If the daily loss results in net equity falling below the exchange established maintenance margin levels¹⁹, additional margin will need to be posted to the account to bring it back to the initial margin level or risk liquidation of the position. To illustrate, consider the following example:

Assume that in January, counterparty A buys/counterparty B sells 10 H2O June contracts at \$500 per af. Both counterparties have exposure to the price of 100 af of water (10 contracts x contract size) or \$50,000.

Counterparty A is classified as having a non-Heightened Risk Profile by their FCM while counterparty B is classified as having a Heightened Risk Profile by their FCM. As such, initial margin for each party is as follows:

Counterparty A (non-HRP)- \$1,500 per contract or \$15,000 in total (\$1,500 x 10 contracts)

Counterparty B (HRP) - \$1,650 per contract or \$16,500 in total (\$1,650 x 10 contracts)

Maintenance margin for both counterparties is \$1,500 per contract or \$15,000 in total

The next day, the H2O June contract settles at \$523 per af. Each counterparty's account balance would change as follows:

Counterparty A's account balance would be credited \$230 (\$23 per contract gain) raising it to \$15,230 while counterparty B's account would be debited the same amount lowering it to \$16,270. The account balances of both counterparties are above the maintenance amount and neither party will have a margin call. This daily tracking of unrealized profits/losses will occur for the life of the contract.

¹⁹ A customer's clearing firm may establish a more stringent margin policy.

Further assume that the H2O June contract price increases to \$700 per AF or \$177 per af from the prior settlement price of \$523 per af. The account balance for each counterparty would now be as follows:

Counterparty A: \$17,000 (\$15,000 + \$230 + \$1,770)

Counterparty B: \$14,500 (\$16,500 - \$230 - \$1,770)

While counterparty A's account balance has increased by \$2,000; counterparty B's account balance has decreased by \$2,000 to \$14,500 and is now below the required maintenance margin of \$15,000. To bring the account back in to compliance, counterparty B would need to deposit at least \$2,000 in their account in order to get back above initial margin levels.

Note that either counterparty may withdraw funds from their margin account up to their respective initial margin amount.

Upon final settlement both counterparties would realize their respective gain or loss. For example, assume that on the third Wednesday in June (final settlement day of the H2O June contract), the NQH2O prints at \$895 per af. Counterparty A would have a net realized gain of \$395 per af (\$895 - \$500) or \$3,950 (\$395 per contract gain x 10 contracts) while counterparty B would have a net realized loss of the same amount.

E. Additional customer/trade protections

Velocity Logic

Velocity logic monitors potential significant price movements in extremely small time increments on CME Globex. It works in conjunction with price banding to preserve the integrity of our markets. Whereas price banding monitors futures price movements that would go too far, velocity logic monitors futures price movements that would go too far, too fast. It's calculated using the highest and lowest prices within a predetermined lookback window.

If a velocity logic violation occurs, the futures market is temporarily suspended, as are all associated options markets.

Price Banding

Price banding rejects orders outside a given range, or band, to maintain orderly markets in futures and options markets whether there is high volatility or not. Bands are calculated dynamically for each product based on the last price, plus or minus a fixed value. If markets quickly move in one direction, the price bands dynamically adjust to accommodate new trading ranges.

Dynamic Circuit Breakers

Dynamic Circuit Breakers (DCB) monitor for significant price movements during a trading session. DCBs define an upper and lower limit of how far an instrument is allowed to move in a configured time interval. For H2O futures, the amount by which a price can vary within a rolling 60-minute lookback window is 10% of the prior day's H2O settlement price, known as the variant. The high and low prices within the window plus or minus the variant determine the DCB high bid and low ask limits during the open market state. If triggered in the primary contract market (lead month), all associated contract markets immediately transition into a 2-minute pre-open state. Learn more [here](#).

Position Limits

Position limits are established based on the known available supply of a particular commodity such that no one party can control/influence market prices/supply. For H2O the position limit for the front month contract, as of the end of May 2021, is 35,000 contracts. Learn more [here](#).

F. The life of a trade

Futures contracts have a limited lifespan that will influence the outcome of your trades and exit strategy.

Water futures expire on the third Wednesday of the contract month. On the expiration day, the Water futures contract financially settles in US dollars to the value of the NQH2O. At expiration, traders will realize the difference between the price at which the contract was entered into and the price at expiry. Prior to expiration, a futures trader needs to decide if they want to exit out of the position (offset the position), extend their exposure (roll) or hold the contract to expiration (settlement).

Offset the Position

Offsetting or liquidating a position is the simplest and most common method of exiting a trade. When offsetting a position, a trader must execute an opposite and equal transaction of their current position. This allows the trader the flexibility to monitor the current market level and assess the profit or loss of offsetting their position at the then prevailing market prices – without taking the futures contract to final settlement.

To offset a position, a trader must take out an opposite and equal transaction to neutralize the trade. For example, a trader who sold ten H2O contracts expiring in September will need to buy ten H2O September contracts prior to the contract's expiration day. The difference in price between her initial position and the offsetting position will represent the profit or loss on the trade.

Rolling

A trader may wish to extend their H2O position and maintain continuous exposure to the contract. This is referred to as rolling the futures or rolling forward and allows a trader to extend a futures contract from one expiration to the next or one that is further out on the curve. This can be transacted using a calendar spread. A calendar spread allows a trader to trade out of an expiring contract and into a deferred contract. By executing a calendar spread, a trader's H2O futures position can be extended into the future by one or more months depending on which deferred contract they "roll" into.

Let's assume, a trader is long - ten, June H2O contracts and wants to extend their long H2O futures exposure to July. The trader enters a single order – known as a calendar spread - to roll the contracts forward. The trader would simultaneously sell the 10 June futures and buy 10 July futures resulting in a net zero position in June, and a long position of 10 July H2O contracts.

By rolling, the trader has seamlessly moved their long position from June to July. While the trader chose to roll into July futures, they could also have rolled into any listed H2O contract (eight consecutive quarterly contracts including the nearest two serial months are listed at any time) - if their investment horizon was longer. The price of that calendar spread may be different depending on the time frame and cost to carry.

Settlement

If a trader has not offset or rolled her position prior to contract expiration, the contract will expire on settlement date, the third Wednesday of the contract month.

For example, if a trader bought ten June H2O contracts at \$500 per af and upon expiration, H2O contracts settled at the NQH2O price of \$895 per af, the trader's account would be credited \$3,950 $[(\$895 - \$500) \times 10 \text{ af} \times 10 \text{ contracts}]$.

You have choices when it comes to managing your futures positions at expiration. However, you will need to decide what works best for your trading strategy. Understanding how to manage expiration is an important aspect of trading H2O futures and managing your trading account.



To learn more about Nasdaq Veles California Water Index futures, visit cmegroup.com/water.

cmegroup.com

Neither futures trading nor swaps trading are suitable for all investors, and each involves the risk of loss. Swaps trading should only be undertaken by investors who are Eligible Contract Participants (ECPs) within the meaning of Section 1a(18) of the Commodity Exchange Act. Futures and swaps each are leveraged investments and, because only a percentage of a contract's value is required to trade, it is possible to lose more than the amount of money deposited for either a futures or swaps position. Therefore, traders should only use funds that they can afford to lose without affecting their lifestyles and only a portion of those funds should be devoted to any one trade because traders cannot expect to profit on every trade.

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