FTR Clearing at Nodal Exchange

PJM FRMSTF

July 21, 2020
Nodal Exchange Overview

• Commodity exchange
  – Designated Contract Market under U.S. CFTC jurisdiction; all contracts are futures contracts
  – >50% market share of U.S. power futures open interest with over 1 Billion MWh
    o 59% market share of PJM power futures open interest end of June 2020
    o Growing quickly with 79% growth rate in traded volume in 2019 over 2018

• Power, natural gas, environmental and trucking freight contracts
  – Providing ability to trade power futures and options on hundreds of hubs, zones, and nodes across seven organized markets (and Mid-C)
    o ISO-NE, NYISO, PJM, MISO, ERCOT, SPP & CAISO
  – Natural gas futures and options contracts for Henry Hub
  – Environmental futures and options on renewable energy certificates, carbon and SO2/NOx emission allowances (largest set of environmental contracts in the world)

• Multiple platforms:
  – Nodal LiveTrade trading screen as well as Deutsche Börse Group’s T7 matching engine with CQG front-end for select contracts
  – Block trades (e.g., broker) submission for clearing

• All contracts are cleared by Nodal Clear using innovative portfolio margining
  – Nodal Clear, LLC has been permitted to elect Subpart C under Part 39 of the Commodity Exchange Act
  – Nodal Clear was recognized as a third-country central counterparty by ESMA in March 2017

• Nodal Exchange became part of the EEX Group on May 3, 2017; EEX Group is in turn part of the Deutsche Börse Group
Nodal Exchange & Nodal Clear are part of a global exchange family

Deutsche Börse Group

\[\text{eeex group}\]

\[\text{eeex}\]
Contracts on energy, environmental products, freight, metals and agriculturals

\[\text{powernext}\]
Spot and derivatives trading for European gas markets and operates the register for French guarantees of origin

\[\text{pegas}\]
Central gas trading platform of EEX Group
Operated by Powernext

\[\text{ecc}\]
Central clearing house of EEX Group

\[\text{eeexasia}\]
Platform for trading in global commodity derivatives, focusing on the Asian markets

\[\text{epexspot}\]
Physical power spot markets: Day-ahead and intraday trading

\[\text{pxe}\]
Centre of competence for the eastern European power markets

\[\text{gaspoint nordic}\]
Part of the PEGAS platform, specialising in the Danish gas market

\[\text{nodal}\]
Derivatives exchange in the North American energy markets
Contracts on electricity and natural gas

\[\text{nodalclear}\]
CFTC registered clearing organization
Central clearing house of all Nodal Exchange contracts
Nodal Exchange’s History is Rooted in Granular Risk Management

Nodal Launches April 2009
First exchange to offer cleared nodal power futures with DC Energy, NextEra, and Macquarie Bank as shareholders

Nodal Clear is Launched
In October 2015, Nodal launched its own clearing house on-boarding 12 clearing members and introducing an award winning margin methodology

FTR Look-alike Contracts Added
In the spring of 2012 Nodal Exchange launched contracts to provide congestion only spreads to assist PJM participants looking to address underfunding risk

Nodal Largest Power Futures Exchange
On May 1 2020, Nodal had the largest congestion trading day in it’s history and later in May Nodal became the largest power futures exchange in North America with the majority of open interest

EEX Group Purchases Nodal
In May 2017, EEX Group, part of the Deutsche Börse Group, acquired Nodal Exchange & Nodal Clear
About one year after the financial crisis storm, world leaders met to agree on a global solution…

The G-20 Leaders in Sep 2009 concurred that:

- “All standardized OTC derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate, and cleared through central counterparties by end-2012 at the latest.”

- “OTC derivative contracts should be reported to trade repositories.”

- “Non-centrally cleared contracts should be subject to higher capital requirements.”
Risk management approaches to forward price, credit, and liquidity risk in energy markets

• Bi-lateral/swaps trading
  ➢ Typically low to zero margin requirements in energy markets where risk is managed by direct counterparty credit limits
  ➢ Key Risk: Daisy chain of defaults

• Pooled Mutualized Risk
  ➢ Solution for organized markets that addresses daisy chain risk
  ➢ Key Risk: Once collateral is exhausted, default is mutualized among trading participants

• Exchange/futures Clearing
  ➢ Approach recommended by G20 countries for risk management that relies on two-tiered credit infrastructure, variation margin and initial margin (regulated by the CFTC in the USA)
  ➢ Multiple layers of protection before any possibility of mutualized risk
“Novation” in cleared market trading leaves the clearinghouse as the central counterparty; clearing members provide an extra layer of protection.

1. A trade is submitted to the exchange.
2. The submission is processed, and the trade is novated.
3. The trade is novated to Nodal Clear as the new buyer, with the clearing member guaranteeing the buyer, and the clearing member guaranteeing the seller.

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Default Waterfall – the clearinghouse has several layers of protection to insulate participants from defaults

- Defaulter’s Initial Margin
- Defaulter’s Guaranty Fund Contribution
- Nodal Clear Contribution
  - $20 million
- Guaranty Fund
  - $212 million*
- Unfunded contributions - assessment
- Service Continuity Phase
- Closure

* As of June 16, 2020

Contributed by all clearing members

Additional funding from surviving clearing members in the event default/guaranty fund is exhausted

Based on DCO’s Recovery Plans; includes measures such as voluntary contributions or variation margin haircutting
Nodal Clear clearing members

- ADM Investor Services Inc. (FCM)
- BNP Paribas Securities Corp. (FCM)
- BofA Securities, Inc. (FCM)
- Citigroup Global Markets, Inc. (FCM)
- ED&F Man Capital Markets Inc. (FCM)
- Goldman Sachs & Co. (FCM)
- Macquarie Futures USA LLC (FCM)
- Mizuho Securities USA Inc. (FCM)
- Morgan Stanley & Co. LLC (FCM)
- RBC Capital Markets LLC (FCM)
- Royal Bank of Canada
- SG Americas Securities LLC (FCM)
- Wells Fargo Securities LLC (FCM)
- Wedbush Securities, Inc. (FCM)
ISO/RTO FTR volumes exceed the cleared market and continue to grow, with trading up 33.5% over the last five years (2014-2019)

U.S. Power Traded Volume

FTR Market Path Volume by Year

Note: The volume is based on awarded obligation volume on the path level.
United States Power Markets

~5K TWh 2018

Physical Forward Contracts

ISO/RTO “Financial Transmission Rights”
(congestion spread markets managed by the ISO/RTO regional organized markets)

13.1K TWh Paths 2019

ISO/RTO Nodal Spot Markets
Day Ahead and Real Time Power

5.5K TWh 2019 Futures

Cleared Futures Contracts
• Nodal Exchange
• ICE
• CME

0.4K TWh 2019 Options

Settle to ISO/RTO Spot Markets

Settle to ISO/RTO Spot Markets (except ICE Mid C)

Market Size Still Unknown

Non-cleared Financially Settled Swaps

Settle to ISO/RTO Spot Markets

ISO/RTO Nodal Spot Markets
Day Ahead and Real Time Power

3.0K TWh ISO/RTO Physical Load in 2018

4.2K TWh Total US Physical Load in 2018

Regulator Key

CFTC
(Commodity Futures Trading Commission)

FERC/PUC
(Federal Energy Regulatory Commission or state Public Utility Commission)

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1. Approximation based on ISO/RTOs serve ~72% of U.S. population and 2018 generation was about 4,178 TWh
What does it mean to settle FTRs through futures by Exchange for Related Position (EFRP) transactions?

• FTR auctions run by the ISO continue to create the FTR positions

• FTR is exchanged for Nodal Exchange futures contracts (i.e., a spread with one futures contract at source and another futures contract at sink) – via execution of an Exchange for FTR (EFTR), a new type of EFRP

• ISO is a counterparty in each EFTR transaction (other counterparty is one of various FTR holders/traders)

• ISO payment mechanism to deliver congestion revenue to FTR holders is replaced with variation margin payments in the futures market; similarly, any payment delivery obligations by the FTR holders are handled through variation margin

• ISO retained congestion revenues will balance any ISO variation margin payments by settlement of the FTR term; similarly, if the FTR is out of the money, the variation margin receipts by the ISO will cover payment obligations to transmission capacity owners
EFTRs bring together superior capabilities across entities into one market solution

**ISO/RTO**
Unique capability to run the FTR auctions as a match between individual paths vs. transmission system capacity operating on a simultaneous feasibility constraint

**Nodal Exchange**
Competitive market services focused on product management, facilitating liquidity growth and transparency, surveillance, and twice daily pricing of tens of thousands of futures contracts

**Nodal Clear**
Expert quantitative and qualitative risk supervision managing price risk, credit risk, and liquidity risk for commodity futures
In a mandatory clearing model, PJM clears FTR auction with Nodal margin calculations, then exposure is transferred to Nodal via EFRP.

- **FTR Participants**
  - Submit orders to PJM and IM to Nodal for auction

- **PJM**
  - Forward order slates to Nodal
  - Reject bids for participants with insufficient IM posted
  - Clear auction and publish awards

- **Nodal Exchange / Nodal Clear**
  - Calculate IM based on order slates from participants [with adjustment for time period between bid submission and clearing]
  - Process awarded FTRs via EFRP (EFTR)
  - Complete next margin run, returning excess margin collected for bid slate or collecting deficit resulting from price changes since bid IM calculation

FTR collateral requirement calculated by Nodal and held by clearing members. PJM will no longer hold collateral related to FTRs prior to, during, or after the auction.
Auction workflow under optional model requires input from an additional entity, Nodal Data Services, and iterative collateral checks.

**FTR Participants**

- Submit orders for auction

**PJM**

- PJM forwards order slates to NDS
- PJM calculates bid collateral, incorporating NDS calc
- PJM runs the auction and forwards draft awards to NDS
- PJM calculates hold collateral, incorporating NDS calc, assuming FTRs remain at PJM

**Nodal Data Services (NDS)**

- Contribute IM calculations based on order slates from participants
- Contribute IM calculations based on draft awards under assumption FTRs remain at PJM

**Nodal Exchange / Nodal Clear**

- FTR collateral starts at PJM assuming full portfolio stays at the ISO, then required margin moves to Nodal if portfolio successfully transferred
- Nodal systems calculate IM requirements for futures settlement
- Nodal Exchange processes EFTRs and sends PJM IM transfer instructions from bid collateral to support incremental margin requirements at Nodal
- Nodal completes next margin run

Participants who have not already indicated must select futures settlement by 8am morning following awards

PJM releases portion of bid collateral to Nodal for participant IM

PJM clears auction and publishes awards

Is award collateral sufficient?

Is bid collateral sufficient?

No

Yes

No

Yes

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After the EFRP, cleared FTR payment obligations are fulfilled via margin payments of the economically equivalent futures

<table>
<thead>
<tr>
<th>FTR Market</th>
<th>Futures Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO Awards FTR to Holder/Trader at a price of $2,112 per MW ($6.00/MWh)</td>
<td>Economically Equivalent Futures</td>
</tr>
<tr>
<td>FTR: 50 MW Hub A (source) to Zone B (sink), Peak, April 2020 (i.e., B/A Spread)</td>
<td>Holder/Trader Position:</td>
</tr>
<tr>
<td>ISO Position: Short B/A Spread at $2,112 per MW ($6.00/MWh)</td>
<td>Long 50MW Zone B, Peak, April 2020 at $39/MWh</td>
</tr>
<tr>
<td></td>
<td>Short 50MW Hub A, Peak, April 2020 at $33/MWh</td>
</tr>
<tr>
<td>FTRs exchanged via EFRP to Nodal Exchange and cleared via Nodal Clear using Energy + Congestion futures contracts. As a spread, the energy component drops out as energy is the same value at any given time within an ISO</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trader is Long B/A spread at $6.00/MWh = FTR Position</td>
</tr>
<tr>
<td></td>
<td>ISO Position:</td>
</tr>
<tr>
<td></td>
<td>Short 50MW Zone B, Peak, April 2020 at $39/MWh</td>
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<td>ISO is Short B/A spread at $6.00/MWh = FTR Position</td>
</tr>
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</table>
The current FTR market cash flows ensure that owners of transmission capacity receive the fixed payments due from the FTR auctions, while the FTR traders take the difference between the FTR auction price and the realized congestion in the spot market . . .

**FTR Market**

Opportunity to manage credit risk through “EFTR”
Moving the open interest to a futures market ensures the same ultimate cash flows are paid, but shifts the timing of the payments in accordance with market expectations.

**Illustration**

### Futures Market

#### A. Immediately upon EFTR

- **FTR Holder/Trader**: Day 1 Settlement Price: $6 = to FTR Award Price
- **ISO**: $0 VM
- **FCM**: $0 VM
- **Nodal Clear**: $0 VM

#### B. Interim periods prior to final settlement (twice daily every business day)

- **FTR Holder/Trader**: Settlement Price: $5
- **ISO**: $1 VM
- **FCM**: $1 VM
- **Nodal Clear**: $1 VM

#### C. Final settlement

- **FTR Holder/Trader**: Final Settlement Price: $8
- **ISO**: $3 VM
- **FCM**: $3 VM
- **Nodal Clear**: $3 VM
Participating in FTR clearing will require PJM to obtain a line of credit (LOC) to meet variation margin obligations to the participants

**LOC Description:**

- Required to meet Nodal twice daily variation margin obligations on the full FTR portfolio
- The LOC will be sized to meet at least 99% of Cumulative cash outflows from the previous 5+ years
- In case the LOC is not sufficiently sized to meet a variation margin call, there is no liquidation. Instead, the ISO portfolio is transferred back to the FTR market prior to an impending default at the current settlement prices
- The impacted counterparties to the ISO are left in an equivalent forward position in the FTR market, minimizing disruptions to their business
- As soon as the LOC is expanded, positions can return to Nodal Exchange to resume full clearing function

**LOC is not responsible for:**

- Credit risk posed by the trading participants.
  - Nodal Exchange and its clearing members guaranty that performance
  - Size of the credit line not linked to exposure to Nodal Exchange
  - A large draw on the line implies the participants are relatively cash flush
  - Should an unlikely clearing member default occur with a large draw on the line, the protections afforded by the clearing model only need to cover the liquidation process, not the collective variation margin that has been paid out
- Meeting traditional initial margin obligations for PJM’s portfolio or guaranty fund requirements. Nodal Clear’s solution removes the need for initial margin and guaranty fund deposits from PJM itself

**LOC Cash Outflows = VM Payments + ARR Payments – Congestion Revenue Collection**
Key benefits of exchanging FTRs for cleared futures contracts

• Opportunities for secondary market trading, providing much greater liquidity to adjust positions and improve hedges

• Improves transparency: Nodal Exchange provides market participants with additional market intelligence on pricing expectations with twice daily marks (i.e., mark to market)

• Improved default protection for all ISO FTR participants: credit risk management solution through guaranteed delivery of FTR payment obligations
  o Defaults handled in cleared environment rather than losses shared by surviving ISO members—from the participants’ perspective, delivery obligations receive enhanced protection
  o Replaces ISO collateral requirements for holding FTRs with margining related to clearing

• Enables netting and cross margining of FTR originated positions:
  o With other power positions (e.g., cleared transactions)
  o With other non-power positions (e.g., natural gas)
  o With futures positions based on power at multiple ISOs
Two flavors of Nodal proposal for FTR credit risk management

<table>
<thead>
<tr>
<th>Proposals for Long Term Solution for Credit Default Risk Management</th>
<th>KYC/Onboarding</th>
<th>Credit and Position Monitoring</th>
<th>Margining Methodology</th>
<th>Risk Reducing Measures</th>
<th>Default Protection beyond Initial Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mandatory Clearing</strong></td>
<td>14 Clearing Members + Nodal Exchange manage this</td>
<td>14 Clearing Members + Nodal Exchange manage this</td>
<td>Nodal Clear solution that combines participants’ FTR and power and gas futures exposures at Nodal Exchange</td>
<td>Twice daily variation margin, ensuring minimum drift from latest expected settlement prices</td>
<td>CM balance sheet + Nodal Clear Contribution + Guaranty Fund + Assessments:</td>
</tr>
<tr>
<td><strong>Optional Clearing</strong></td>
<td>See mandatory</td>
<td>See mandatory</td>
<td>See mandatory</td>
<td>See mandatory</td>
<td>See mandatory</td>
</tr>
<tr>
<td></td>
<td>PJM</td>
<td>PJM + Nodal Data Services (“NDS”) consultation</td>
<td>Greater of new PJM model or NDS calculation</td>
<td>Potential for Mark to Auction with NDS price input</td>
<td>Potential for NDS-advised participant guaranty fund</td>
</tr>
</tbody>
</table>

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Handling a participant default under FTR Clearing shifts the burden and responsibility for credit risk management to a CFTC-regulated, two-tiered model.

**Tier One Protection**

- Participant Default
- Clearing Member Capital
  - ($5 Billion for average Nodal FCM)

**Tier Two Protection**

- Clearing Member Default
- Nodal Clear Default Waterfall
  - (Nodal Clear capital plus clearing member guaranty fund and assessment resources: ~$750 MM)
Clearing FTRs at Nodal Clear provides the following credit default protections\(^1\) to PJM before any socialized risk sharing could take place:

<table>
<thead>
<tr>
<th>Tier</th>
<th>Participant Default</th>
<th>Clearing Member Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>$162 MM</td>
<td>$20 MM</td>
</tr>
<tr>
<td>Average</td>
<td>$5,160 MM</td>
<td>$20 MM</td>
</tr>
<tr>
<td>High</td>
<td>$18,661 MM</td>
<td>$20 MM</td>
</tr>
</tbody>
</table>

Clearing at Nodal provides significant capital protection ($~5 Billion plus ~$750 MM on average) to all but eliminate credit risk for FTRs traded at the ISO

1. Clearing Member adjusted net capital (ANC) figures and Nodal Clear contributions as as of May 15, 2020. Nodal Clear Guaranty Fund figures are estimates based on modeling FTR clearing activity on Nodal Exchange from summer of 2019, with updates for increases in the current GF included in the average and high estimates.
2. The high and average estimates exclude Royal Bank of Canada, which clears for its house business, and has $78.2 billion in ANC. Also ANC figures exclude any financial support from parent companies—this is regulatory capital on the books of the FCMs alone.
3. Nodal Clear assessments only apply to surviving clearing members. The range of reduced calls are explored in the low, average, and high estimates.
Thank you!