Nasdaq Playbook for Incident Management

Nasdaq Nordic & Baltic Exchanges and Nasdaq Clearing

Revision 3.0
05 Sep 2025

Document History

Revision	Published	Summary of Changes
1.0	30 JUN 2022	First revision.
2.0	25 OCT 2024	Nasdaq Clearing processes incorporated. Adjusted time for Market re-opening notifications aligned to FESE principles - Providing a minimum 15-minute notice before re-opening the market following an outage.
3.0	05 SEP 2025	Minor correctional changes in table of content and changes in section 3.2. Updated sections related to Fixed Income. Section 2.1 System overview and new section 2.9 NFITS Fixed Income Trading added.

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1. About the Playbook

This playbook provides trading and clearing participants an overview on the handling of a incidents at Nasdaq Nordics & Baltics Trading venues and Nasdaq Clearing (Nasdaq Stockholm AB, Nasdaq Helsinki Ltd, Nasdaq Copenhagen A/S, Nasdaq Iceland hf, Nasdaq Vilnius AB, Nasdaq Riga AS and Nasdaq Tallinn AS (the Exchange) and Nasdaq Clearing AB (the Clearing House)) including information relating to incident communication to the market, as well as the internal operational procedures that are activated in the event of an incident. In addition, it gives a system resilience overview for the critical systems.

The definition of an incident is a technical or operational disturbance that could seriously disturb the function of the Exchange or the Clearing House. The actual or potential business impact determines the severity classification of the incident.

This playbook is Nasdaq's contribution to a broader industry discussion on best practices for trading venues and clearing houses in connection to incidents. Nasdaq has been an active participant in a FESE working group together with other European trading venues to establish a joint framework built on 10 principles (see link section) for incident management, to which this playbook is aligned.

This is a playbook and in the event of any discrepancies, conflicts or ambiguities in relation to the exchange- or clearing rules and any rule related documents, the latter should prevail as the legally binding documentation.

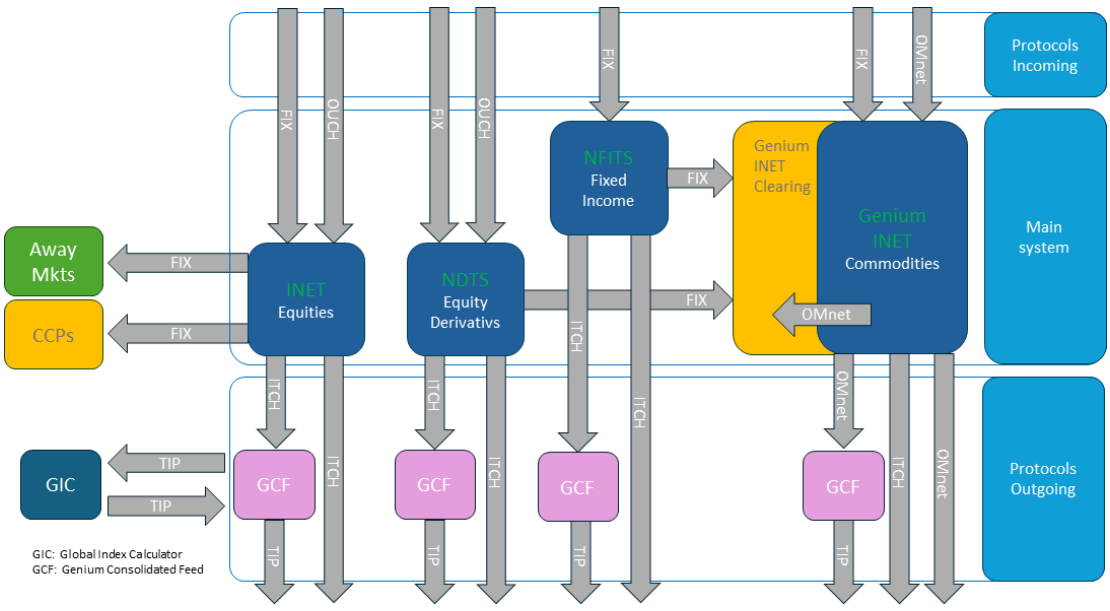
2. System Resilience

It is of utmost importance for Nasdaq to provide solid and robust systems and procedures for the operation of the markets. Any system disturbance or emergency shall be addressed and resolved within the shortest time possible.

Consequently, Nasdaq has made extensive efforts and spent significant resources on dedicated organizations, routines, and system solutions to maintain continuity of business and minimize the impact of system disturbances or emergencies.

Nasdaq has a 24/7 organization ready to act in case of incidents or emergencies affecting Nasdaq's systems, facilities or personnel. The organization includes Incident Management, Emergency Response and Crisis Management. Business Continuity and Disaster Recovery Plans that can be initiated on several levels.

2.1. System Overview



2.2. Disaster Recovery

Nasdaq has Disaster Recovery Plans (DRP´s) for each critical system platform. The DRP contains procedures for recovery and continuation of systems and services used by Nasdaq. The DRP focuses on the technology that supports critical business processes.

2.3. System Redundancy and Failover

Nasdaq's critical market systems are designed to provide redundancy and failover functionality. The failover solution depends on the type of system and component involved.

2.4. Primary and Secondary Sites

Nasdaq distributes its production systems on two separate sites with independent infrastructure, including their own power supply to ensure protection from power grid blackouts. The primary site is in the Stockholm Sweden area, approx. 30 km from the secondary site. The secondary site acts as a standby site, where systems and processes can be promoted to run as primary. From a connectivity standpoint the sites are equal. Customers can connect to either/both the primary or secondary site, thus being able to reduce their risk and lessen the impact of a system disturbance affecting one site. Both locations have a high security level both in terms of physical protection from fire or water etc., as well as any unauthorized access or other external threats.

2.5. System Failover Procedures

In the event of a serious system disturbance, making the primary site unable to continue operating, system operation will need to failover to the secondary site. Failover functionality is divided into failover of back-end systems or components thereof, and failover of customer connections. The behavior is different depending on which system and which protocols/APIs are affected. If it´s required Nasdaq will instruct it´s members on necessary actions for recovery. Below is a concise description of the failover functionality per system and protocol/API.

2.6. INET Nordics – Cash Equity trading

The INET Nordic central system components run on the primary site. The central systems on the secondary site are in hot standby mode, meaning that data is mirrored, and sequencing synchronized in real time. The FIX, OUCH and ITCH protocol connectors are active and available on both sites. OUCH and ITCH allow concurrent logons to primary and secondary site, and FIX allows logon to either primary or to secondary port.

2.6.1 FIX

The FIX protocol offers one FIX account use of ports on the primary or on the secondary site one at a time. FIX solution is hot-hot, meaning that FIX ports on both sites are on a listening state, and an instant failover with synchronized sequencing between primary and secondary site is available at any time. Failover is a client-initiated process, and a logon made toward the secondary port will force a logoff if there is a client connected to the primary port (or vice versa).

In the event of a primary site failure, the FIX ports on the secondary site will not be possible to use until the routing engine is running in primary mode on the secondary site.

2.6.2 OUCH – order management protocol

The OUCH protocol offers one OUCH account concurrent use of ports on the primary and secondary site. Both OUCH ports will accept orders and cancel requests, and outbound messages will be sent on each port. Customers are advised to use the ports on the primary site for the lowest latency. In this configuration, a failover will be seamless as the secondary connection is immediately available.

In the event of a primary site failure, the OUCH ports on the secondary site will not be possible to use until the matching engine is running in primary mode on the secondary site

2.6.3 ITCH – information feed protocol

The ITCH protocol offers one ITCH account concurrent use of ports on the primary and secondary site. Market data messaging can be received on both ITCH ports. Customers are advised to use the ports on the primary site for the lowest latency. In this configuration, a failover will be seamless as the secondary connection is immediately available.

In the event of a primary site failure, the ITCH ports on the secondary site will not be possible to use until the matching engine is running in primary mode on the secondary site.

2.6.4 Co-Location - Customer located servers and equipment within the Nasdaq Data Center

Co-location customers have both the primary and the secondary ports located on the primary site. These customers are offered to enhance their Business Continuity plans by purchasing co-location cabinets and power at the secondary (i.e. disaster recovery) site.

In the event of a primary site failure, the FIX, OUCH and ITCH ports on the disaster recovery site will not be possible to use until the routing and/or matching engine are running in primary mode on the disaster recovery site.

2.7. Genium INET – Trading (Commodities) and Clearing

The Genium INET central system components run on the primary site. The central systems on the secondary site are in hot standby mode, meaning that data is mirrored, and sequencing synchronized in real time. The OMnet Gateways are active and available on both sites.

Nasdaq Clearing offers access through OMnet API and FIX, as well as several independent software vendors (ISVs).

2.7.1 OMnet

OMnet Gateways offers redundancy in two layers. The customers connect to single IP and port on a load balancer, which distributes the connection to one out of several physical OMnet Gateway behind it. An individual OMnet Gateway failure will lead to loss of service for the customers connected to it. When the customer reconnects, the load balancer will direct the connection to another OMnet Gateway.

A failure of the connection between the OMnet Gateway and the transaction router that connects to the central system will cause a failover to another transaction router.

In the event of a primary site failure, customers will need to connect to the secondary site.

2.7.2 FIX

FIX failover is available in two phases, 1) between FIX gateways on the primary site, and 2) if the primary site is unavailable, to the secondary site:

The FIX gateways on the primary site are configured in pairs. Both FIX gateways in a pair are hosting primary connections. The corresponding secondary port is configured on the other FIX gateway. Customers are only able to connect to the primary port. In the event of a FIX gateway failure, the secondary ports will be enabled for connection. The FIX sequence numbers are shared between the FIX gateways, enabling a customer to continue on the secondary connection.

In the event of a primary site failure, the FIX gateways on the secondary site will be enabled for customer connections. Customers would need to connect to their primary port on the secondary site. The FIX gateways are in cold standby, meaning that sequence numbers from the primary site are not known, The FIX sessions are created as new sessions and customers need to reset the sequence numbers to 1. There are no secondary FIX gateways on the secondary site.

2.7.3 ITCH – information feed protocol

The ITCH protocol offers one ITCH account concurrent use of ports on the primary and secondary site. Market data messaging can be received on both ITCH ports. Customers are advised to use the ports on the primary site for the lowest latency. In this configuration, a failover will be seamless as the secondary connection is immediately available.

In the event of a primary site failure, the ITCH ports on the secondary site will not be possible to use until the matching engine is running in primary mode on the secondary site.

2.7.4 Co-Location - Customer located servers and equipment within the Nasdaq Data Center

Co-location customers have both the primary and the secondary ports located on the primary site. These customers are offered to enhance their Business Continuity plans by purchasing cabinets and power at the secondary (i.e. disaster recovery) site.

OMnet is available on both sites. In the event of a primary site failure, the FIX and ITCH ports on the disaster recovery site will not be possible to use until the routing and/or matching engine are running in primary mode on the disaster recovery site.

2.8. NDTS - Nordic Equity Derivatives Trading

The NDTS Nordic central system components run on the primary site. The central systems on the secondary site are in hot standby mode, meaning that data is mirrored, and sequencing synchronized in real time. The FIX and OUCH protocol connectors are active and available on both sites.

2.8.1 FIX

The FIX protocol offers one FIX account use of ports on the primary or on the secondary site one at a time. FIX solution is hot-hot, meaning that FIX ports on both sites are on a listening state, and an instant failover with synchronized sequencing between primary and secondary site is available at any time.

Failover is a client- initiated process, and a logon made toward the secondary port will force a logoff if there is a client connected to the primary port (or vice versa). Customers are advised to use the ports on the primary site for the lowest latency.

In the event of a primary site failure, the FIX ports on the secondary site will not be possible to use until the routing engine is running in primary mode on the secondary site.

2.8.2 OUCH – order management protocol

The OUCH protocol offers one OUCH account concurrent use of ports on the primary and secondary site. Both OUCH ports will accept orders and cancel requests, and outbound messages will be sent on each port. Customers are advised to use the ports on the primary site for the lowest latency.

In this configuration, a failover will be seamless as the secondary connection is immediately available. In the event of a primary site failure, the OUCH ports on the secondary site will not be possible to use until the matching engine is running in primary mode on the secondary site.

2.8.3 ITCH – information feed protocol

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2.8.4 Co-Location - Customer located servers and equipment within the Nasdaq Data Center

Co-location customers have both the primary and the secondary ports located on the primary site. These customers are offered to enhance their Business Continuity plans by purchasing co-location cabinets and power at the secondary (i.e. disaster recovery) site.

In the event of a primary site failure, the FIX, OUCH and ITCH ports on the disaster recovery site will not be possible to use until the routing and/or matching engine are running in primary mode on the disaster recovery site.

2.9. NFITS – Fixed Income Trading

The NFITS central system components run on the primary site. The central systems on the secondary site are in hot standby mode, meaning that data is mirrored, and sequencing synchronized in real time. The FIX protocol connectors are active and available on both sites.

2.9.1 FIX

The FIX protocol offers one FIX account use of ports on the primary or on the secondary site one at a time. FIX solution is hot-hot, meaning that FIX ports on both sites are on a listening state, and an instant failover with synchronized sequencing between primary and secondary site is available at any time.

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2.10. Genium Market Info

Genium Market Info (GMI) offers concurrent connections to receive the Genium Consolidated Feed (GCF). The Genium Market Info central system runs as a primary instance on the primary site, with a secondary instance on the secondary site. Data is replicated real time to the secondary instance, making the Genium Consolidated Feed available to customers connecting to either site.

INET, Genium INET and the Global Index Calculator (GIC) are the main sources of raw market data to Genium Market Info. The services on the Genium Market Info central system are separated per source, enabling backend redundancy on a per source basis. As an example, INET and GIC could be sources from one site, while Genium INET could come from the other site. Irrespectively, the Genium Market Info system and hence the Genium Consolidated Feed is available on both sites.

2.10.1 TIP

Genium Market Info offers concurrent connections to receive the Genium Consolidated Feed through the TIP protocol.

2.11. Testing Site Functionality and Failover

As a baseline, the current Nasdaq systems have undergone thorough failover tests as part of the pre-production integration tests.

To exercise procedures and safeguard against possible errors in configuration, full primary site failover tests in the production systems are performed on a yearly basis.

2.12. Customer Failover Testing

Failover functionality is available for all protocols/API. Customers can connect to either or both of the primary and secondary sites. It is important that customers can verify that their applications and their failover arrangements work as expected. To what extent this can be done in the production system depends on the type of system they connect to. Customers are recommended to implement failover capacity in their applications. Certification of application failover capacity is offered but it’s not a mandatory requirement.

2.12.1 INET Nordics, NDTS and NFITS

Full site failover tests in the INET Nordic, NDTS and NFITS production systems are performed on a yearly basis. These tests are both internal as well as a yearly offered external opportunity for members to test their readiness. Customers are advised to test failover procedures in the test system (NTF). System generated failover events are performed according to a weekly schedule. For the current failover setup please check schedule on the member extranet.

2.12.2 Genium INET

Full site failover tests in the Genium INET production system are performed on a yearly basis; participants and the financial market infrastructure are invited to test connectivity. Customer failover testing can be performed and verified by the customers by dropping the connection to the primary site.

If a customer should wish to simulate a failover without their own intervention, they can contact Nasdaq business operations for a forced shutdown of the chosen connection.

2.12.3 Genium Market Info

Full site failover tests in the GMI production systems are performed on a yearly basis. These tests are internal. Genium Market Info offers concurrent connections to receive the Genium Consolidated Feed. Customers are recommended to connect to both sites in order to not lose any data.

Failover can be tested and verified by customers by shutting down their own primary connections and switch to receiving data from the secondary connection, or in case of only connecting to the primary, reconnect to the secondary site. If a customer should wish to simulate a failover without their own intervention, they can contact Nasdaq business operations for a forced shutdown of the chosen connection.

2.12.4 Genium INET - Clearing

Full site failover tests in the Genium INET Clearing production system are performed on a yearly basis; participants and the financial market infrastructure are invited to test connectivity. Customer failover testing can be performed and verified by the customers by dropping the connection to the primary site.

If a customer should wish to simulate a failover without their own intervention, they can contact Nasdaq business operations for a forced shutdown of the chosen connection.

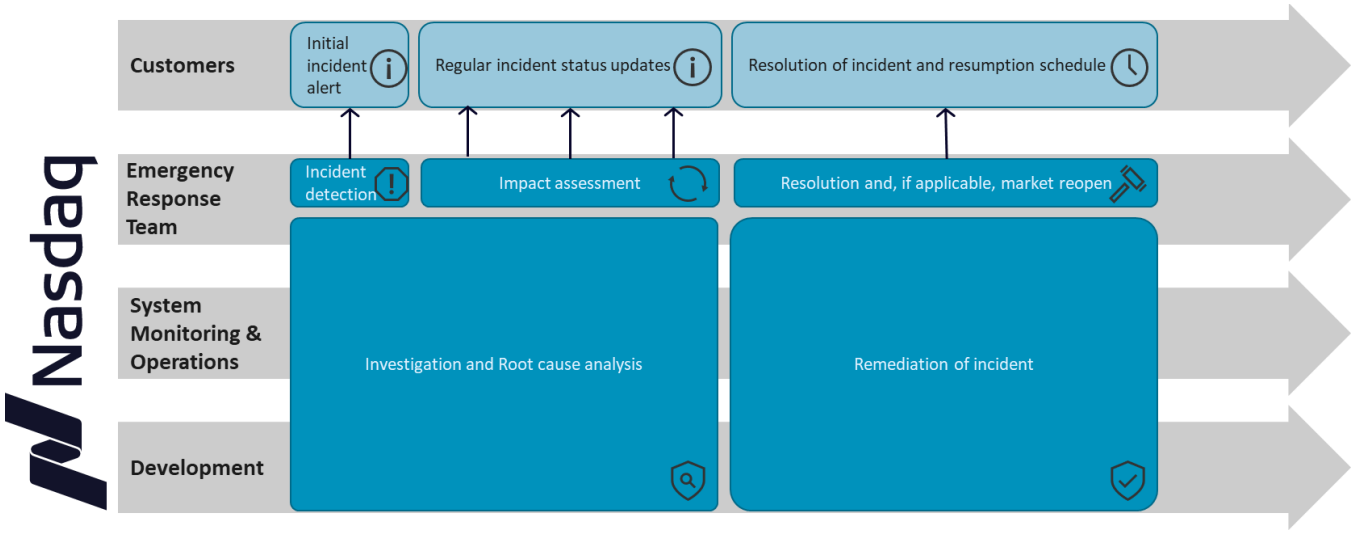
3. Incident Handling

Nasdaq ERT (Emergency Response Team) is a 24/7 function responsible for managing all incidents, bring in internal or external resources as needed, communicating externally and internally, and performing required actions such as market halts or resumptions.

The ERT is prepared to react swiftly and efficiently in case of a disturbance. Upon detection of an issue, pre-established procedures are activated to facilitate a timely resolution.

When an Incident has been initiated and the ERT has been summoned, the ERT is thereafter:

- Assessing the impact of an incident,
- Investigating the cause of the disturbance and its estimated duration,
- Keeping the market continuously informed of any developments and what actions to take,
- Ensuring that relevant internal and external disturbance messages are sent out without delay,
- Managing the incident in a manner that preserves the trust of the market participants,
- Working towards a coordinated approach together with stakeholders
- Ensuring that critical decisions are not left outstanding and enforce any actions needed to minimize disturbances,
- Proposing and initiating such changes that might prevent a recurrence of the incident or minimize its consequences,
- If a disaster or serious incident occurs or if an incident is at risk of developing into such a state, escalation to the Nasdaq Crisis Management Team (CMT) should be done without delay.



3.1. Incident training

The Nasdaq conducts regular incident training, including scenarios of different emergency situations.

Nasdaq also conducts regular Disaster Recovery tests including yearly failover tests between data centers to practice operational procedures and test the technical infrastructure. Nasdaq invites and encourages its members to join these exercises to assure that the participants efficiently can manage a full-scale failover from the primary to secondary server sites.

The outcome from all incident exercises and actual major incidents are evaluated afterwards. If needed procedures or technical functionality are updated to avoid re-occurring issues or to facilitate a more efficient process.

3.2. Incident Communication

Communication during incidents is made through disturbance notices, sent by email and SMS to recipients that are subscribed to the service. To request a new subscription or change an existing subscription, users are instructed to visit the Nasdaq Website (see link under section 5.8). Incident information is also published on Nasdaq Nordic Market Status website (https://www.nasdaq.com/european-markets/status) were also the historical disturbance messages are available together with the current status of the trading and clearing platforms for the Nasdaq Nordic & Baltic venues.

Indications or confirmed issues are typically reported via the Nasdaq Operations& Technical support teams. After an initial assessment the issue may be escalated to the ERT function for a criticality assessment.

3.3. Incident updates

Depending on the severity of the incident, Nasdaq has protocols to send periodic updates of its disturbance messages. For a complete market outage, that interval target is maximum 15 minutes, for less severe incidents, it would be less frequent. Each disturbance message typically includes indicative time of next message where the incidents prompt periodic updates. Nasdaq maintains a set of disturbance message templates to facilitate quicker drafting and distribution. While it is a hard balance to be fast and accurate in incident communication, Nasdaq aims to issue an initial disturbance message as quick as possible, sometimes at the expense of complete description of issue or impact.

3.4. Monitoring of Fair and Orderly Markets

In connection to a disruption to a Nasdaq system or service, Nasdaq will make an assessment if fair and orderly trading conditions exist in accordance with the respective applicable rules. In general, a material failure in matching engine(s), order entry protocols or gateways, or the market data dissemination from the Nasdaq system would mean that fair and orderly trading conditions do not exist and the respective Nasdaq market would be halted.

Market halts and resumptions are described in Nasdaq's respective rules and rule related documents (links below). The rules describe the set of actions that the Nasdaq may take in connection to an outage/disruption and provide a framework of how the Nasdaq may suspend markets or parts of markets, how trading will be resumed and provisions for possible extensions of the trading day. In addition, Nasdaq has published a market halt/resume criteria document with further guidance on events that would trigger a market halt.

In general, derivatives with traded underlying assets are halted if the underlying contracts are halted. This is primarily relevant for equity and index related derivatives such as stock and index futures and options, warrants and ETP’s.

Trade cancellations in connection to a market outage are decided by Nasdaq in adherence with its respective rules and where relevant the cancellation guideline. In general, cancellation of trades is effected and communicated to participants ahead of a market resumption to enable participants to know its positions.

3.5. Market Re-opening Procedures

Nasdaq's ambition is always to resolve disruptions and incidents affecting our markets as quickly as possible, still with a consideration to always operate fair and orderly markets. In severe incidents where a Nasdaq market or segment has been halted, Nasdaq communicates a resumption schedule to market participants in advance of resuming trading and/or clearing. Announcement to resume trading and/or clearing after a halt is generally made around 15 minutes in advance of the scheduled trading and/or clearing resumption.

The announcement of resumption of trading and/or clearing after a halt typically provides information regarding the timing and sequence of session states during the reopening, a status on orders entered before the halt and a status of trades concluded before the halt. Typically, halted order books are flushed before reopening and the announcement states the status of orders for clarity. The status of trades conducted before a halt is determined by Nasdaq in accordance with the respective rules and where relevant the cancellation guidelines.

Typically, resumption of trading after a market outage would be done through the same opening mechanism as applied per market segment in the ordinary market opening, e.g., through an auction. In extraordinary situations, following an outage or delayed opening, Nasdaq may decide to extend the trading and/or clearing day in accordance with the respective rules. If an outage occurs late in the day, close to end of trading and/or clearing, Nasdaq may decide to resume trading and/or clearing through a closing auction or extend clearing business hours. Lastly, Nasdaq may decide not to resume trading and/or clearing if fair and orderly trading or clearing conditions do not exist.

If Nasdaq were to resume trading and/or clearing from its secondary server site, information of that effect and connectivity details are included in the resumption announcement.

In addition to considering the stability of its trading system including order entry and market data, Nasdaq will consider participant connectivity and market readiness in its assessment to resume trading after a halt.

3.6. Backup Procedure for Closing Price and Settlement Price Determination

In the event closing prices cannot be established in the regular manner, for its cash equities markets the Nasdaq would determine appropriate closing values, normally the last traded price prior to the outage assuming an intraday outage.

For the derivatives markets the relevant close price will be the last traded price in any contract.

Settlement prices for Equity and Index derivatives will be derived from the reference price from the relevant underlying. Expiration will follow the procedure according to Exchange and Clearing rules Chapter A, section A.6.

Settlement Prices including Expiration for Fixed Income derivatives will follow the procedures according to the contract specifications in the Exchange and Clearing rules Chapter C.

Settlement Prices including Expiration for Commodities contract will follow the procedures according to the contract specifications in the Exchange and Clearing rules, Appendix 2, part A, and the Commodities Market Model Appendix B.

Closing prices and Settlement prices will be published in the usual Market data feeds and be accompanied by exchange notices clarifying on timings, content of the data and attachments of data.

3.7. Post Incident Analysis and Communication

In the event of a major incident, Nasdaq will follow up on the normal incident communication by publishing a notice with details on the root cause, resolution or mitigation measures that have been taken to prevent any re-occurrence of the incident.

Major incidents are reported to the relevant regulators. When relevant, Nasdaq also provides opportunity for additional member communication via suitable client forums or bilateral interaction.

4. Contacts

For general support and queries about ongoing issue please contact:

INET, NDTS & Genium INET -Equities, Derivatives (Equity, Fixed Income, Commodities) Fixed Income Cash:

EMO@nasdaq.com / +46 8 405 7700

Nasdaq Clearing:

clearing@nasdaq.com / +46 8 405 6880

5. Links and references

Latest version of the rulebooks are published on Nasdaq webpages.

5.1. Nasdaq Nordic Member Rules

https://www.nasdaq.com/solutions/rules-regulations-nordic-member-rules

- Nasdaq Nordic Member Rules - Section 3.6 Extraordinary and Regulatory Measures
- Nasdaq Nordic market halts/resume criteria
- Cancellation Guidelines Nasdaq Nordic Member Rules

5.2. Nasdaq Baltic Market Rules

https://nasdaqbaltic.com/market-regulation/rules-and-regulations/

5.3. Derivatives Rules

https://www.nasdaq.com/solutions/rules-regulations-derivatives-rules

- Chapter 1-6, Section 1.9 - Extraordinary Measures
- Chapter A, Section A.6 - Settlement prices for Equity and Index derivatives
- Chapter C - Settlement Prices including Expiration for Fixed Income derivatives

5.4. Clearing Rules – Derivatives

https://www.nasdaq.com/solutions/rules-regulations-derivatives-rules

- Chapter 1 – Section 1.17 Extraordinary Measures
- Chapter A, Section A.6 - Settlement prices for Equity and Index derivatives
- Chapter C – Settlement Prices including Expiration for Fixed Income derivatives

5.5. Commodities Rules

https://www.nasdaq.com/solutions/legal-framework-european-commodities

- Trading Rules - Section 8.1.5 Force Majeure events
- Appendix 4 Trading Procedures – Chapter 18 Suspension of Trading and Chapter 19 Emergency Powers

5.6. Clearing Rules - Commodities

https://www.nasdaq.com/solutions/legal-framework-european-commodities

- Clearing Rules – Section 17.6 Extraordinary Measures
- Joint Appendix 2, Contract Specifications, part A

5.7. Nasdaq Nordic/Baltic Business Continuity Plan

https://www.nasdaq.com/solutions/inet-nordic-environments

- Nasdaq Nordic/Baltic Business Continuity Plan Description (under the section Resource Center)

5.8. Market Status and disturbance subscription service

Disturbance notices subscription:

https://www.nasdaq.com/european-markets/status#

5.9. Federation of European Securities Exchanges

Trading Venue Outages

https://www.fese.eu/key-themes/exchange-playbooks-on-outage-protocols/