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Transmission-Distribution Coordination Working Group: IAM Communication Interfaces

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Agenda

- Introduction & Background
- IAM Communication Interfaces
- Current State Overview
- Key Datasets Submitted to the IESO
- Key Datasets Sent by the IESO
- Q&A

Introduction & Background

- TDWG's overarching objective is to support the development of **operational coordination protocols** that will detail the actions to be taken and information to be shared by the parties, ensuring the effective and reliable operation of DER(A) as they participate in the IESO-Administered Markets (IAM) and as DER(A) may provide services to the distribution system
- Currently, there are 5 key deliverables underway intended to provide technical analysis and contextual information to support to development of these coordination protocols:

  - A. Coordination Protocols
  - B1. Functional Assessment
  - B2. Communication Assessment
  - B3. Shared Platform Concept
  - B4. Architectural Assessment

IAM Communication Interfaces

- The intent of **Deliverable B2. Communication Assessment** (led by Hydro One) is to map the coordination interfaces among IESO, LDCs and DER(A), detailing exchanged data, including the existing methods used, options for new methods, and an initial assessment of potential new options.

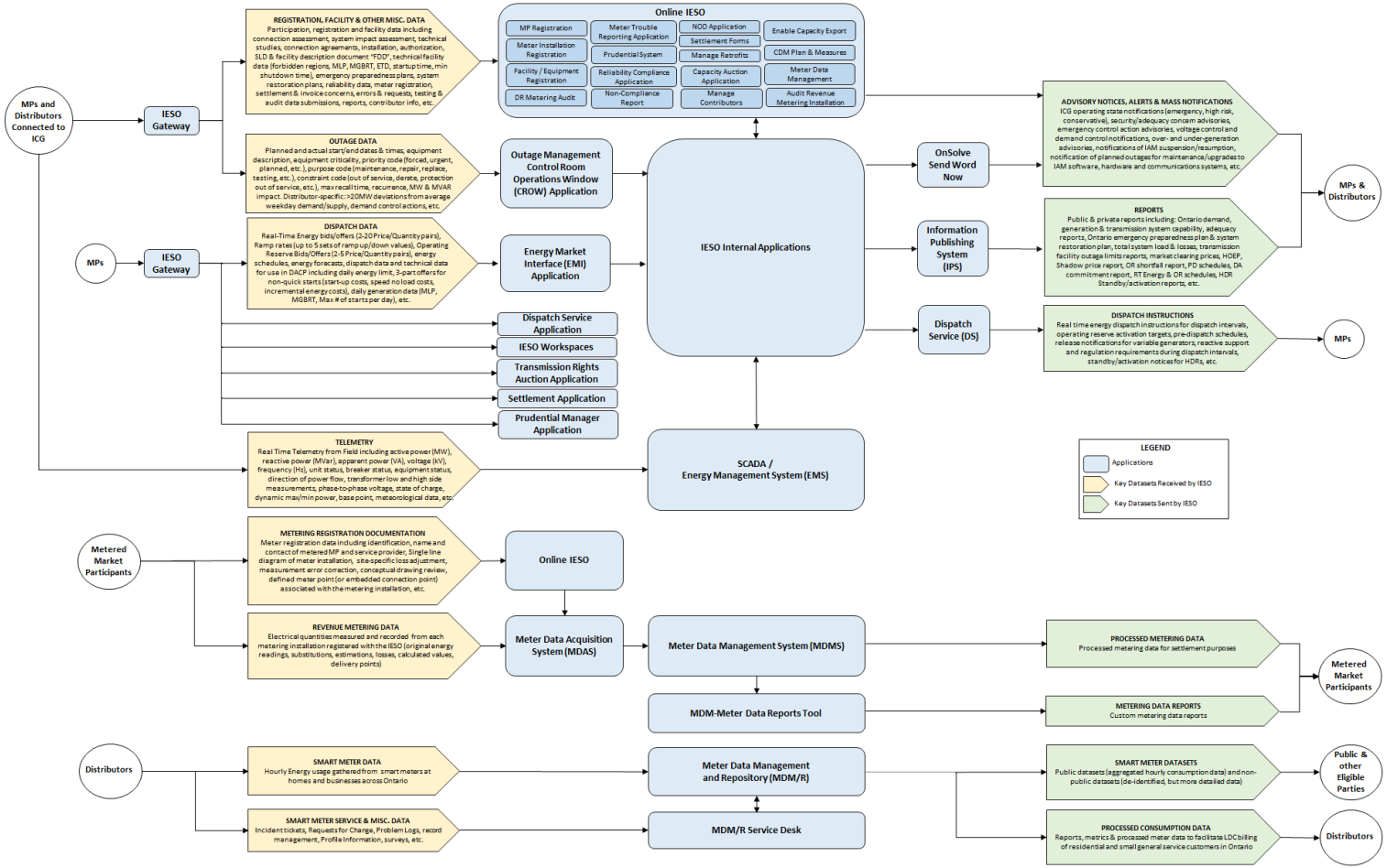
- To support this deliverable, the IESO has prepared an overview of its current state of:
  - Key types of data exchanged with LDCs and Market Participants;
  - Data coordination interfaces; and
  - Communication mediums used to exchange the data.

IAM Communication Interfaces (Continued)

Notes & assumptions :

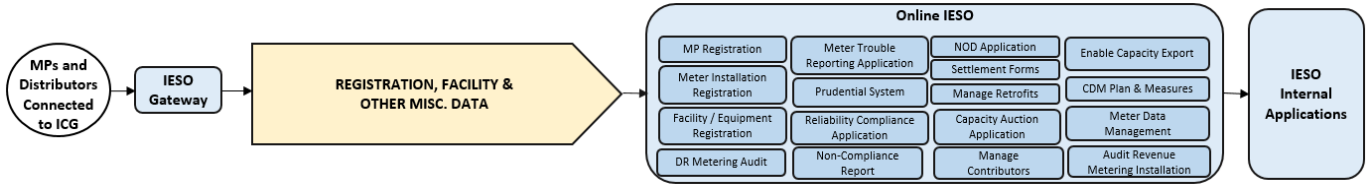
- This initiative focuses on key datasets that are considered relevant to the TDWG.
    - Information pertaining to other areas, such as imports, exports, physical bilateral contracts, financial markets, etc., have been excluded from the analysis.
- The information presented in this document is based on the existing set of market rules & manuals, however certain details will change post-MRP (e.g., naming conventions & timelines associated with the new day ahead market "DAM"). However, the overarching key datasets exchanged will not change.
- Disclaimer: This presentation contains a summary of information pulled from several market rules and market manuals. To the extent of any discrepancy or inconsistency between the provisions of a particular market rule or manual and the summary, the provision of the market rule or manual shall govern.

Current State Overview



Key Datasets Submitted to the IESO

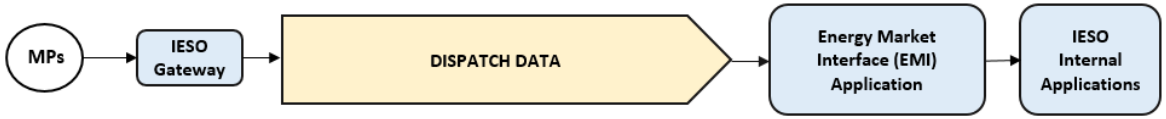
Registration, Facility & Other Misc. Data



Data Exchanged	▪ **Registration, Facility & Other Misc. Data**: Participation, registration and facility data including connection assessment, system impact assessment, technical studies, agreements, installation, authorization, single line diagram (SLD) & facility description document (FDD), technical facility data [e.g. forbidden regions, minimum loading point (MLP), Minimum Generation Block Run-time (MGBRT), elapsed time to dispatch (ETD), start-up time, min shutdown time], emergency preparedness plans, system restoration plans, reliability data, settlement & invoice concerns, errors & requests, testing & audit data submissions, reports, contributor info, etc.
Freq. / Timing	▪ Some data is provided once upon registration, other data may be updated as changes occur or provided as required.
Data Coordination Interfaces	▪ IESO Gateway: secure identity provider (IdP) provides access to market facing applications ▪ Online IESO: web-based registration system allowing all organizations involved in the IESO-controlled grid (ICG) & IESO Administered Markets (IAM) to complete a variety of interactive business tasks and submit information to the IESO in a safe, secure and efficient manner. Online IESO system securely hosts a number of market applications.
Comm. Mediums	▪ Internet (user account/identity credentials required for authentication & access to secure IESO web servers & systems) ▪ Email used for some communications & data submissions
Parties Involved	▪ Data submitted by registered Market Participants (MPs) and Distributors connected to the ICG[1] ▪ This data is received by the IESO and used by multiple internal applications within the IESO

[1] Distributors connected to the ICG or designated pursuant to MR Ch 4. s 7.5.2

Dispatch Data



Data Exchanged	▪ **Dispatch Data**: Real-Time Energy bids/offers (2-20 Price/Quantity pairs), Ramp rates (up to 5 sets of ramp up/down values), Operating Reserve (OR) Bids/Offers (2-5 Price/Quantity pairs), energy schedules, energy forecasts, dispatch data and technical data for use in the Day Ahead Commitment Process (DACP) including daily energy limit, 3-part offers for non-quick starts (start-up costs, speed no load costs, incremental energy costs), daily generation data (MLP, MGBRT, Max # of starts per day), etc.
Freq. / Timing	▪ Dispatch data may be submitted (without restriction) from 06:00 EST day-ahead until 2 hours prior to the dispatch hour for which the submitted data applies. Standing dispatch data can be submitted at any time in advance of the 06:00 EST day-ahead. To be considered for optimization in the DACP, dispatch data must be submitted before 10:00 EST day-ahead (or between 10:00-14:00 if a valid reason code is provided).
Data Coordination Interfaces	▪ IESO Gateway: secure identity provider (IdP) provides access to market facing applications ▪ Energy Management Interface (EMI): web-based application used for participating in the RT Energy and OR Markets to submit and manage dispatch data. Some MPs also submit data via an EMI Application Programming Interface (API).
Comm. Mediums	▪ Internet (user account/identity credentials required for authentication & access to secure IESO web servers & systems) ▪ Certain information (e.g., change requests in mandatory window) must be communicated via telephone to the IESO Control Room
Parties Involved	▪ MPs participating in IAM, including generators (dispatchable, self-scheduling, intermittent, variable), electricity storage participants, dispatchable loads, hourly demand response resources, etc. ▪ This data is received by the IESO and used by multiple internal applications within the IESO

Outage Data

Data Exchanged	▪ **Outage Data**: Planned and actual start/end dates & times, equipment description, equipment criticality, priority code (forced, urgent, planned, etc.), purpose code (maintenance, repair, replace, testing, etc.), constraint code (out of service, derate, protection out of service, etc.), max recall time, recurrence, MW & MVAR impact. Distributor-specific: >20MW deviations from average weekday demand/supply, demand control actions, etc.
Freq. / Timing	▪ As required. Equipment criticality dictates timeframes within which planned outage request must be submitted.
Data Coordination Interfaces	▪ IESO Gateway: secure identity provider (IdP) provides access to market facing applications ▪ Outage Management Control Room Operations Window (CROW) Application: Web-based outage management system used for coordinating, scheduling and tracking outages. Some MPs also submit data via an outage management system API.
Comm. Mediums	▪ Internet (user account/identity credentials required for authentication & access to secure IESO web servers & systems) ▪ Certain types of outages and information must be communicated via telephone to the IESO Control Room
Parties Involved	▪ Data submitted by registered MPs and Distributors connected to the ICG[1] ▪ This data is received by the IESO and used by multiple internal applications within the IESO

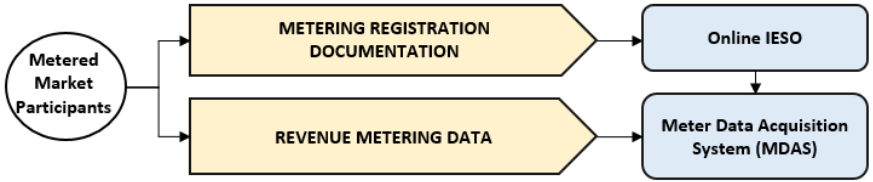
[1] Distributors connected to the ICG or designated pursuant to MR Ch 4. s 7.5.2

Telemetry

Data Exchanged	▪ **Telemetry**: Real Time Telemetry from Field including active power (MW), reactive power (MVar), apparent power (VA), voltage (kV), frequency (Hz), unit status, breaker status, equipment status, direction of power flow, transformer low and high side measurements, phase-to-phase voltage, state of charge, dynamic max/min power, base point, meteorological data, etc.
Freq. / Timing	▪ Telemetry monitoring and performance requirements vary by resource type and size. Additional details can be found in the IESO's Telemetry Requirements Presentation
Data Coordination Interfaces	▪ Supervisory control and data acquisition (SCADA) / Energy Management System (EMS): system of remote control and telemetry used to monitor and control the electric system.
Comm. Mediums	IESO receives telemetry via one of three methods: ▪ Remote Terminal Unit (RTU) via DNP3 (Distributed network protocol 3) ▪ Intermediate communication gateway (HUB) ▪ Inter Control Center Communication Protocol (ICCP) link.
Parties Involved	▪ Telemetry submitted by registered MPs and Distributors connected to the ICG[1] ▪ Telemetry data is received by the IESO and used by multiple internal applications within the IESO

[1] Distributors connected to the ICG or designated pursuant to MR Ch 4. s 7.5.2

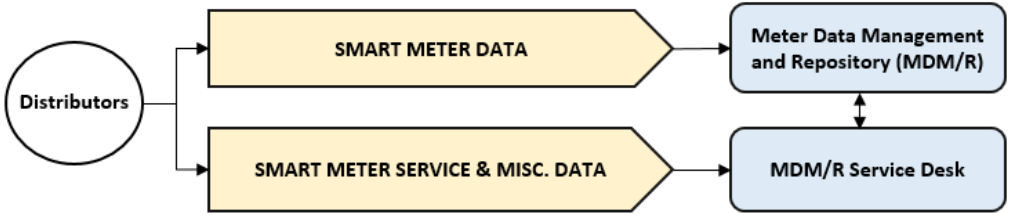
Revenue Meter Data



Data Exchanged	▪ **Metering Registration Documentation:** Meter registration data including identification, name and contact of metered MP and service provider, Single line diagram of meter installation, site-specific loss adjustment, measurement error correction, conceptual drawing review, defined meter point (or embedded connection point) associated with the metering installation, etc. ▪ **Revenue Metering Data:** Electrical quantities measured and recorded from each metering installation registered with the IESO (original energy readings, substitutions, estimations, losses, calculated values, delivery points)
Freq. / Timing	▪ Meter setup details submitted upon registration & updated as required. ▪ Metering data is made available for each metering interval (5 or 15 minutes), or in some cases, for each dispatch hour[1]
Data Coordination Interfaces	▪ Online IESO ▪ Meter Data Acquisition System (MDAS): application used for registering metering installations and collecting metering data.
Comm. Mediums	▪ TCP/IP (Transmission Control Protocol/Internet Protocol), complying with the IESO's TCP/IP model for site-to-site VPN (Virtual Private Network)
Parties Involved	▪ Revenue meter data is submitted by all metered market participants ▪ Data is received by the IESO and used for settlement purposes

[1] Applicable to meters that serve non-dispatchable load, self-scheduling generation & storage, transitional scheduling generators or intermittent generators.

Smart Meter Data

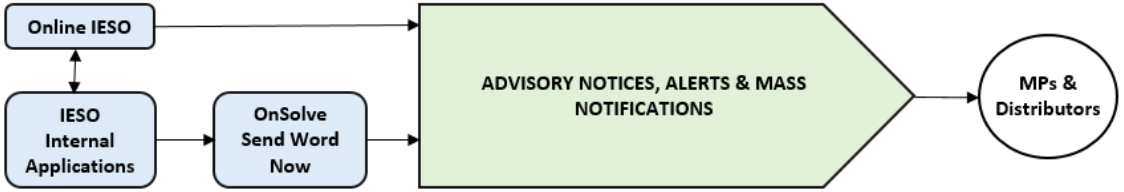


Data Exchanged	▪ **Smart Meter Data:** Hourly energy usage gathered from smart meters at homes and businesses across Ontario. ▪ **Smart Meter Service & Misc. Data**: Incident tickets, requests for change, problem logs, record management, profile information, surveys, etc.
Freq. / Timing	▪ Smart metering data is collected from the meter hourly ▪ Service & misc. data submitted as required.
Data Coordination Interfaces	▪ Meter Data Management and Repository (MDM/R): Central platform for storing, processing, validating and managing smart meter data. One of the largest shared service/transactional systems in the world, supporting all of Ontario's distributors. ▪ MDM/R Service Desk: Online services management interface.
Comm. Mediums	▪ Applicability Statement 2 (AS2), Business-to-Business (B2B) via internet, mTLS 1.3
Parties Involved	▪ Smart meter data is submitted by all local distribution companies in Ontario. ▪ The IESO as the designated Smart Metering Entity (SME) develops, manages and protects Ontario's MDM/R[1]

[1] Note: the IESO does not currently use SME data for the purposes of the IAM, however there is potential to utilize SME data in the future.

Key Datasets Sent by the IESO

Advisory Notices, Alerts & Mass Notifications



Data Exchanged	▪ **Advisory Notices, Alerts & Mass Notifications:** ICG operating state notifications (emergency, high risk, conservative), security/adequacy concern advisories, emergency control action advisories, voltage control and demand control notifications, over- and under-generation advisories, notifications of IAM suspension/resumption, notification of planned outages for maintenance/upgrades to IAM software, hardware and communications systems, etc.
Freq. / Timing	▪ As required, in accordance with the conditions & triggers for issuing advisory notices, alerts and mass notifications as detailed in the applicable MRs & MMs[1]
Data Coordination Interfaces	▪ Online IESO ▪ OnSolve Send Word Now: Critical communications tool used by the IESO to send alerts and mass notifications. ▪ Advisories and notifications are available on the IESO website via the RSS feeds
Comm. Mediums	▪ Internet (IESO website & RSS feeds) ▪ In certain cases, notifications or alerts may be provided over email, telephone and/or SMS
Parties Involved	▪ The IESO issues advisories, notifications and alerts for various reasons to various audiences including MPs and Distributors

[1] References to MRs & MMs are included in the Appendix.

Reports

Data Exchanged	▪ **Reports:** Public & private reports including Ontario demand, generation & transmission system capability, adequacy reports, Ontario emergency preparedness plan & system restoration plan, total system load & losses, transmission facility outage limits reports, market clearing prices, hourly Ontario energy price (HOEP), Shadow price report, OR shortfall report, pre-dispatch schedules, day-ahead commitment report, Real-time Energy & OR schedules, HDR Standby/activation reports, etc.
Freq. / Timing	▪ Frequency & timing varies by type of report, as detailed in the applicable MRs & MMs[1]
Data Coordination Interfaces	▪ Information Publishing System (IPS): Reports are generated using an IPS. Public reports are available via the IESO Reports Site. Login credentials are required to access confidential reports which are published to the MP private report portals.
Comm. Mediums	▪ Internet (IESO Report Site & MP private report portals)
Parties Involved	▪ The IESO publishes public and private reports for various audiences including MPs and Distributors.

[1] References to MRs & MMs are included in the Appendix.

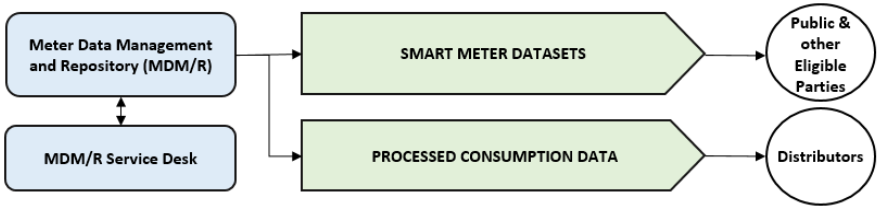
Dispatch Instructions

Data Exchanged	▪ **Dispatch Instructions:** Real time energy dispatch instructions (MW targets) for dispatch intervals, operating reserve activation targets, pre-dispatch schedules, release notifications for variable generators, reactive support and regulation requirements during dispatch intervals, standby/activation notices for HDRs, etc.
Freq. / Timing	▪ Every 5 minutes, hourly, or as required (e.g., OR activation, one-time dispatch)
Data Coordination Interfaces	▪ Dispatch Service: Application used by the IESO to send dispatch instructions. Dispatch Service also has a web user interface which allows MPs to retrieve and accept/reject dispatch instructions as well as search current and historical dispatch instructions. Some MPs also utilize a dispatch service API.
Comm. Mediums	▪ Internet (user account/identity credentials required for authentication & access to secure IESO web servers & systems) ▪ Communication via telephone in certain situations (e.g., verbal dispatch if MPs are disconnected from Dispatch Service)
Parties Involved	▪ IESO issues dispatch instructions to MPs (ICG connected facilities and some embedded facilities) ▪ MPs interact with Dispatch Service via the IESO Gateway or API and have the ability to accept or reject dispatch instructions.

Processed Revenue Meter Data

Data Exchanged	▪ **Processed Metering Data:** Metering data for settlement purposes ▪ **Metering Data Reports:** Metering data reports (e.g., successive versions as they are processed)
Freq. / Timing	▪ Processed metering data align with settlement schedules. ▪ Metering data reports are published as required to the private report portals based on the MP's meter data profiles
Data Coordination Interfaces	▪ Meter Data Management System (MDMS): metering database application used to storage and manage metering data. MDMS receives data from MDAS and generates totalization tables. Processed data is then exported to Replacement Settlement System (RSS) (formerly the Commercial Reconciliation System) for the settlement of the IAM. ▪ MDM-Meter Data Reports Tool: tool used to generate metering data reports based on meter data profiles
Comm. Mediums	▪ Internet (user account/identity credentials required for authentication & access to private report portals)
Parties Involved	▪ Processed revenue meter data is used by the IESO for the settlement of all metered market participants. ▪ Metered market participants can access metering reports published by MDM-Meter Data Reports tool via their private report portals

Processed Smart Meter Data



Data Exchanged	▪ **Smart Meter Datasets:** Public datasets (aggregated hourly consumption data) and non-public datasets (de-identified, but more detailed data) ▪ **Processed Consumption Data:** Reports, metrics & processed meter data to facilitate distributor billing (time of use, tiered pricing, ultra low overnight rate) of residential and small general service customers in Ontario
Freq. / Timing	▪ Hourly Electricity Consumption Data reports published monthly. Processed consumption data aligns with distributor billing schedules.
Data Coordination Interfaces	▪ Meter Data Management and Repository (MDM/R): Central platform for storing, processing, validating and managing smart meter data. One of the largest shared service/transactional systems in the world, supporting all of Ontario's distributors. ▪ MDM/R Service Desk: Online services management interface.
Comm. Mediums	▪ Applicability Statement 2 (AS2), Business-to-Business (B2B) via internet, mTLS 1.3
Parties Involved	▪ Aggregated anonymized Smart Meter datasets are available to the public, and lower levels of aggregated data is available to other eligible parties (e.g., Canadian governmental entities, municipalities, academic institutions, etc.) ▪ Processed smart meter data is received by distributors for billing purposes[1]

[1] Note: the IESO does not currently use SME data for the purposes of the IAM, however there is potential to utilize SME data in the future.

Feedback Questions

1. Are there any other key datasets that your organization is currently submitting to or receiving from the IESO that were not identified in this presentation? If yes, please provide details including the data exchanged, frequency/timing, data coordination interfaces used, and communication mediums used.
2. In addition to the key datasets identified in this presentation, are there any other key datasets required to be communicated between the IESO and your organization for effective T-D coordination?

Questions or Comments?

Thank you

Appendix

References to Market Rules & Market Manuals

Additional information pertaining to data and communication requirements, uses, timing and frequency can be found using the following references:

Registration, Facility & Other Misc. Data	▪ Market Rules Chapter 2, 4, 5, 6 & 7 (incl. appendices) ▪ Market Manual Part 1.3, 1.4, 1.5, 2.1, 2.8, 2.11, 3.1, 3.2, 3.4, 3.5, 3.6, 3.7, 5.4, 7.2, 7.8, 7.10, 11.2, 12, 13.1
Outage Data	▪ Market Rules Chapter 5 (incl. appendices) ▪ Market Manual Part 7.3
Dispatch Data	▪ Market Rules Chapters 7 & 8 (incl. appendices) ▪ Market Manual Part 4.2 & 9.2
Telemetry	▪ Market Rules Chapter 4 (incl. appendices)
Dispatch Instructions	▪ Market Rules Chapters 5 & 7 (incl. appendices) ▪ Market Manual Part 4.3
Reports	▪ Market Rules Chapters 5, 7 & 8 (incl. appendices) ▪ Market Manual Part 2.8, 2.11, 4.2, 4.3, 7.2, & 9.3
Advisories, Alerts & Mass Notifications	▪ Market Rules Chapters 5, 7 & 8 (incl. appendices) ▪ Market Manual Part 4.2, 7.1, 7.2
Revenue Meter Data	▪ Market Rules Chapters 6 & 9 (incl. appendices) ▪ Market Manual Part 3.1, 3.2, 3.4, 3.5, 3.6, 3.7, 5.2
Other Helpful Data Resources	▪ Register Facility Help File (detailed technical data requirement tables) ▪ MM 11.3 – Reliability Information Catalogue