Energy Portfolio Management

IE T&D User Guide

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The product described in this documentation may be connected to, and/or communicate information and data via, a network interface, which should be connected to a secure network. It is your sole responsibility to ensure a secure connection to the network and to establish and maintain appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc.) to protect the product, the network, your systems, and the interface against any kind of security breach, unauthorised access, interference, intrusion, leakage, damage, or corruption or theft of data. We are not liable for damages or losses related to any such security breach, unauthorised access, interference, intrusion, leakage, damage, or corruption or theft of data.

Contents

Chapter 1: Overview

This guide will provide an introduction to the IE T&D functionality in the Market Operations application. It will guide the user through configuring/preparing the system for use of this functionality and through using the various functions provided by the system.

The phrase "IE T&D" collectively refers to the following functionality relating to the transmission and distribution systems in Ireland:

- Importing and viewing meter data messages from the MRSO/ESBN and from EMMA/NIE T&D (includes message type codes 300, 300S, 300W, 305, 306, 306W, 307, 307W, 310, 310W, 320, 320W, 332, 332W, 341, and 342)
- Importing and viewing aggregated demand data messages from the MRSO/ESBN and from NIE (includes message type codes 591, 595, 596, and 598 and includes the CSV format published by NIE).
- Processing meter data and aggregated demand data into the Retail Operations data model for use in load settlement, aggregation, and scheduling.
- Validating/shadowing ESBN's/NIE's calculations of aggregated demand data using the Retail Operations load settlement and aggregation functions
- Comparing/verifying the supplier net demand volumes used in SEM settlement against the internally calculated aggregated demand data (from the Retail Operations load aggregation function) and against the aggregated demand data published by the MRSO/ESBN and EMMA/NIE T&D.
- Importing and viewing TUoS and DUoS invoice backing sheets from DSO/ESBN, EirGrid, NIE, and SONI.
- Performing validation and shadow settlements of TUoS and DUoS invoice backing sheets for both ROI and NI jurisdictions.
- Performing shadow settlements of ROI PSO and NI CCL, PSO, and SSS invoices and generating backing-sheet-level details.

1.1 References

The following ABB user documents provide supplementary information and are referenced by various sections of this user guide.

- Implementation Guide for SEM
- Server Installation Guide
- Load Aggregation Implementation Guide for SEM

References to these documents below will be indicated by the following icon:

1.2 Definitions

Several terms are used in the content that follows. Some terms correspond to concepts in SEM (Single Electricity Market – also known as "All Island Pool"), some correspond to concepts in the Transmission and Distribution systems (and respective system operators and associated interfaces), and others correspond to concepts in the Retail Operations application and data model.

The reader of this document is assumed to have basic familiarity with all three of these topics: the SEM market in Ireland, the Transmission and Distribution systems and system operators in Ireland (IE T&D), and the Retail Operations application. To assist with clarity, especially since some sections below will use IE T&D terms whereas others may instead use Retail Operations term, the following list defines the most frequently used terms in this document.

1.2.1 Terms related to SEM

- **Supplier Unit:** Corresponds to a SEM unit with a resource type of "SU". Generally, a supplier unit corresponds to a retail supplier of electricity.
- **Participant:** An entity that participates in the SEM market and has one or more registered units. A Supplier Participant will have only supplier units registered. A Generator Participant will have only generator units and/or an interconnector unit registered.
- **Net Demand:** The loss-adjusted net demand volume used as a determinant in SEM settlement statements for Supplier Participants. Also known as *NDLF*.
- **Jurisdiction:** Either Ireland or Northern Ireland or both.

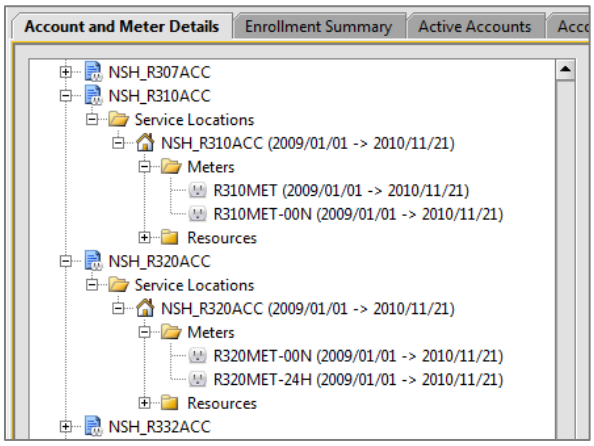
1.2.2 Terms related to T&D Systems

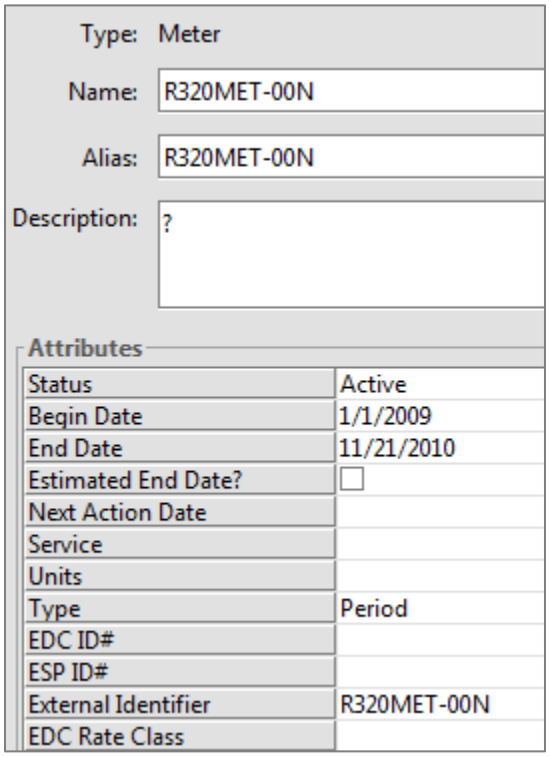
- **MPRN:** Meter Point Registration Number. A unique identifier for each metering point connected to the transmission and distribution network.
- **Meter Serial Number:** The serial number for an individual meter installed at a meter point. Multiple meters and thus multiple serial numbers can be installed at a single meter point.
- **Register:** An individual register on a meter. A single meter can record measurements of more than one kind. Each measurement is stored in its own register.
- **DUoS Group:** In ROI, this term is used to indicate the tariff code applied to a given MPRN for financial settlement of DUoS invoices.
- **Tariff Code:** This term indicates the tariff code applied to a given MPRN for financial settlement of TUoS invoices in ROI and for both DUoS and TUoS invoices in NI.
- **QH / HH:** Quarter-Hourly / Half-Hourly. This term is used to describe *interval* metered MPRNs.
- **NQH / NHH:** Non-Quarter-Hourly / Non-Half-Hourly. This term is used to describe *non*-interval metered MPRNs.
- **Profile Code:** The "shape" used for estimating the contribution of a non-interval (NQH/NHH) MPRN to the total net demand for a given quarter-hour or half-hour interval. For a given year, a standard set of coefficients (one per interval) is published per profile code. Combined with the usage factor of a non-interval MPRN, this can be used to estimate the MPRN’s demand for a single interval.

1.2.3 Terms related to the Retail Operations Application

- **Entity:** An entity is a generic *object* in the Retail Operations system. Almost everything in the system is considered an entity. These include business entities for modeling retail accounts and enrollments, as well as other objects in the system used for everything from security/authorization to defining custom business rules/processes.
- **Entity Domain:** An entity "domain" is a category/type of entity. For example, all retail account entities belong to the "Account" domain.
- **Temporal Data:** Attributes and relationships that can vary across time are called *temporal* attributes and relationships.
- **Load Aggregation:** Functionality in the Retail Operations application that is used to calculate aggregate demand. Load aggregation is used to perform bottom-up forecasts and backcasts as well as perform usage allocations for non-interval consumption records. For IE T&D, only the Load Settlement module from the home page will be used. The Load Forecasting module is only used for forecasting whereas Load Settlement is where the other supported functions can be accessed (backcast/load aggregation and usage allocation).
- **Account:** A retail account. For IE T&D and load aggregation calculations, the Account is analogous to the MPRN.
  - **Account Status:** Accounts can change from active to inactive and vice versa over time. So a key temporal attribute of the account is its status.
- **Service Location:** A service location – also known as *premises* – represents a physical location associated with an account. A single account, if its model option is set to "Meter", may have multiple service locations. For IE T&D and load aggregation calculations the Service Location is analogous to the MPRN, and thus each account has one and only one service location.
- **Meter:** A meter represents a single meter installed at a service location. For IE T&D and load aggregation calculations, a Meter is identified by its Meter Serial Number. The exceptions to this rule follow:

  In the Retail Operations model a meter's consumption in any interval will be mapped to a single TOU period. However, night storage heating meters may register consumption in 24H and night (00N) periods, which overlap, or have multiple night registers and thus multiple night consumption readings. Night storage heaters, and any other meter registering consumption in overlapping TOU periods, must be modeled in Retail Operations as two separate meters. If the meter's timeslot code is not 24H, the meter is identified by the combination of its Meter Serial Number and timeslot code, separated by a hyphen. The screenshots below show the Account and Meter Details tree view, as well as details for one of the meters configured to use an 00N-related TOU template. The tree view also shows that the 24H TOU period can be added explicitly to the meter name as in the R320MET-24H meter, rather than implicitly as in the R310MET meter.



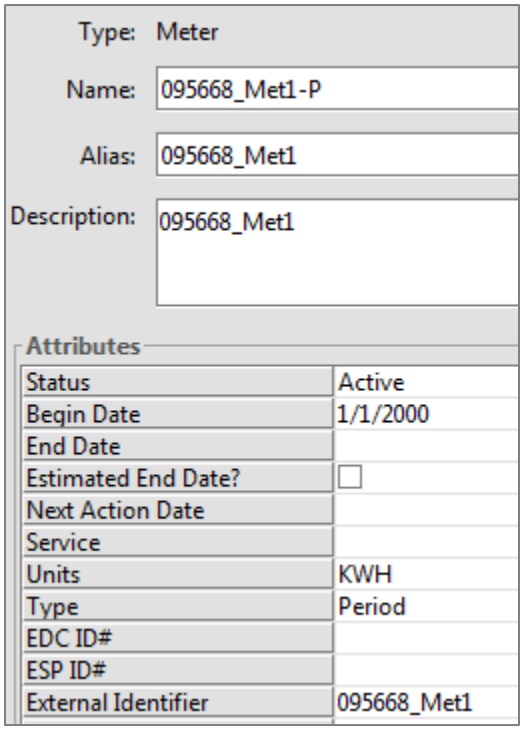


Type:	Meter
Name:	R320MET-00N
Alias:	R320MET-00N
Description:	?

Attributes

Status	Active
Begin Date	1/1/2009
End Date	11/21/2010
Estimated End Date?	☐
Next Action Date	
Service	
Units	
Type	Period
EDC ID#	
ESP ID#	
External Identifier	R320MET-00N
EDC Rate Class	

- A Meter entity in Retail Operations has a meter type of either Interval or Period, and that meter type may not change over time. However, IE T&D meters may switch between interval and period meter types without changing serial numbers. If a meter changes meter types, it must be configured as two Meter entities in Retail Operations. Each Meter is named with its serial number followed by either "-I" for an interval meter type or by "-P" for a period meter type. The example screenshot below shows a sample meter of Period type, where the meter name has the "-P" suffix but the meter external identifier only has the serial number.



Type:	Meter
Name:	095668_Met1-P
Alias:	095668_Met1
Description:	095668_Met1

Attributes

Status	Active
Begin Date	1/1/2000
End Date	
Estimated End Date?	☐
Next Action Date	
Service	
Units	KWH
Type	Period
EDC ID#	
ESP ID#	
External Identifier	095668_Met1

- For meters associated with non-participant generators, the unique identifier must be the combined Meter Serial Number and EARN ID, separated by a hyphen. Import channels must be associated with their own meter entity, and do not require the EARN ID to be part of the identifier. Each meter with export channels should be associated with the schedule group representing the EARN ID, and each meter with import channels should be associated with the schedule group representing the supplier unit and loss factor.

- **Channel:** A single meter can record more than one measurement via one or more meter channels. For IE T&D, the Channel is analogous to the Register. However, in the Retail Operations model, meter channels are only supported on interval meters.
- **UOM / Unit of Measurement:** For interval meters, the unit of measurement is an attribute on meter channels that indicates the type of measurement recorded by that channel. For non-interval meters, consumption records have a unit of measurement attribute. Multiple registers on an NQH/NHH meter serial number are modeled as consumption records with various units of measurement.
- **ESP / Energy Service Provider:** A retail supplier of energy. For IE T&D and load aggregation calculations, the ESP is analogous to the SEM Supplier Unit.
- **EDC / Energy Distribution Company:** A distribution network operator. In IE T&D, there are two EDCs: ESBN in the Republic of Ireland and NIE in Northern Ireland.
- **SC / Schedule Coordinator:** A schedule coordinator generally represents a market or independent system operator. For IE T&D, there are two SCs for retail schedules – ESBN and NIE – and one for wholesale schedules – SEM.
- **Schedule Group:** A Schedule Group is used for grouping accounts and meters for purposes of aggregating demand into schedules. For IE T&D and load aggregation calculations, Schedule Groups must be configured and assigned to meters in a particular manner so downstream functions (like calculation of Supplier Unit net demand and settlement validation) perform correctly. See *Retail Operations Load Aggregation Implementation Guide for SEM* for more information.
- **PSE / Purchasing Selling Entity / Billing Entity:** A PSE in Retail Operations is a generic entity that can be used for aggregating retail demand into schedules and for billing/settlements. There will be one PSE per SEM participant. Furthermore, there will be multiple PSEs per SEM participant for which SEM shadow settlements are performed (see the *Market Operations Implementation Guide for SEM* for more details). There is also one PSE per invoice sender for retail invoices (TUoS, DUoS, CCL, PSO, and SSS invoices).
- **POD / Point of Delivery / Service Point:** A service point generally represents a physical point in the transmission system for scheduling. There will be one service point per unit in SEM (includes all three of supplier, generator, and interconnector units). There will also be one service point per non-participant generation unit. For NI, this means one additional service point per supplier unit (representing the non-participant generation for that supplier unit). For ROI, this means one service point per EARN ID.
- **Meter Type:** Meters and Schedule Groups both have an attribute named Meter Type. Meter Type is used to distinguish between interval and period meters.
  - **Interval:** Interval meters record measurements every interval – generally every 30 minute or 15 minute interval depending on jurisdiction. For IE T&D, this is analogous to QH and HH.
  - **Period:** Period meters accumulate measurements and final quantities (generally a sum for integrated units of measurements like energy and a peak/max for instantaneous units of measurement like power). For IE T&D, this is analogous to NQH and NHH. The terms "period" and "non-interval" are generally interchangeable except when the term period is referring to a "time of use period".
- **Calendar:** Calendars or Load Models are combinations of one or more Load Profiles or one or more Load Profile Libraries. For IE T&D and load aggregation calculations, Calendars are nearly analogous to Profile Codes. They are not direct analogs because Retail Operations requires one calendar per profile code per TOU template.

- **Load Profile:** A load profile is a single load shape, represented as historical meter data ("Historical" profile type), as coefficients applied to weather data to estimate weather-sensitive demand ("WRF" profile type), or as a single "typical" day of average historical meter data by season and day type ("Typical Day" profile type). For IE T&D and load aggregation calculations, all profiles will be Historical profiles and there should be one calendar per load profile and vice versa.
  - For a given profile code, there will be a load profile for the 24-Hour TOU template that has the profile shape/coefficients as published. There will also be a load profile for the Day/Night TOU template, which must be calculated by re-normalizing the values in the 24-Hour load profile by day and night TOU periods.
- **Entity Group:** Just as entities are generic objects in the system, an entity group is a generic way to group together entities. Groups must be homogeneous – meaning that all entities assigned to an entity group must be of the same entity domain. For IE T&D and retail settlements, "Account" entity groups (entity groups that contain account entities) are used to model DUoS Groups and Tariff Codes.

Chapter 2: Configuring the System

The initial steps to configuring the Retail and Market Operations application for IE T&D functionality involve database configuration.

Some of these steps can be done using administrative functions in the application user interface, but other steps requiring executing SQL scripts – using Oracle SQL-PLUS or equivalent.

It is highly recommended to configure the application for SEM market operations prior to configuring it for IE T&D functionality as numerous steps below depend on steps from the SEM configuration. See the *Market Operations Implementation Guide for SEM* for more details.

2.1 Database Scripts

The first steps involve running SQL scripts.

The application server setup program creates a folder of Oracle scripts during installation. This folder will be referenced as <*OracleScripts*> in the steps below.

1. Before setting the application up for IE T&D functionality, you **must first** set the application up for SEM market operations. See the Market Operations *Implementation Guide for SEM* for more information. At a minimum, the following steps must be run prior to configuring the system for IE T&D:

   Execute the script: `<OracleScripts>\MarketOperations\SEM\SetupMarket.sql`

2. Once the SEM market has been setup, you can configure the IE T&D functionality in a similar fashion:

   Execute the script: `<OracleScripts>\MarketOperations\TDIE\SetupMarket.sql`

2.2 UI Configuration Files

Importing user interface configuration for the reports and screens that are specific to IE T&D functionality is done as part of the database scripts described in the previous section. If, however, an error is encountered during this step, it may be necessary to load this configuration manually. This section details this manual procedure.

2.2.1 How to Load Configuration Files

You will first need to open the System Object Configuration view.

1. Login to the application as an administrative user or "super-user"
2. Click the "Admin" link in the home page tree
3. Select the tab named System Object Configuration

To import a file, right-click in the tree and select **Configuration Import/Export** > **Configuration Import**. In the resulting dialog, leave the Exchange Type set to the default (Import All; Overwrite) and choose the file you want to import by clicking the button labeled "**…**" next to the Import File Name field. Finally, click the **Run** button to initiate the import. A message will be shown indicating the final disposition of the import operation once it has completed.

If a prior configuration import operation is left "open", it will be necessary to first close it. Similarly, if you load a file and the application indicates that it remains "open" (due to configuration conflicts identified during the import/merge step); you will need to close it before loading any subsequent files.

To close an import operation, perform the following steps:

1. Open the System Object Configuration view (see above for details)
2. Right-click in the tree, and select **Configuration Import/Export** > **Configuration Import Results**
3. In the resulting view, select the file imported from the Import drop-down at the top-left. It should be the top-most entry and should be indicated as open.
4. Right-click in the upper-right grid, labeled Configuration Objects, and choose **Manage Import** > **Close Import**.

2.2.2 Loading IE T&D Configuration Files

The following IE T&D configuration file must be loaded:

- <*OracleScripts*>\MarketOperations\TDIE\TDIEConfigs\TDIESystemConfig.xml

2.3 Shadow Settlement Configuration Files

The next step involves importing charge component configuration for shadow settlement of TUoS, DUoS, CCL, PSO, and SSS invoices.

2.3.1 How to Load Configuration Files

You will first need to open the ROML Publish and Subscribe view.

1. Login to the application as a "super-user"
2. Click the "Admin" link in the home page tree
3. Select the tab named ROML Publish and Subscribe

From this view, you can import a file by clicking the **Import from File** button in the left-hand panel. You will be prompted to select a file to import and can browse your computer's file system from this prompt. After selecting the file, click the **OK** button.

2.3.2 Loading IE T&D Configuration Files

The following configuration files must be loaded using the steps described above:

- *<OracleScripts>*\MarketOperations\TDIE\Entity_Groups.roml
- *<OracleScripts>*\MarketOperations\TDIE\ni_duos.roml
- *<OracleScripts>*\MarketOperations\TDIE\roi_duos.roml
- *<OracleScripts>*\MarketOperations\TDIE\roi_tuos.roml
- *<OracleScripts>*\MarketOperations\TDIE\SSS_PSO_CCL_Products.roml

2.4 Configuring Purchasing Selling Entities

Purchasing Selling Entities – frequently referred to as PSEs – are business entities in the application. The *Market Operations Implementation Guide for SEM* requires that several PSEs be configured for each SEM market participant represented by the implementation.

In addition to the attributes described in the SEM guide for creating and configuring these entities, the following additional configuration must be applied:

- All PSEs that represent SEM *supplier* market participants (that is, registered with supplier units, not generator units) must have the **Is Retail Aggregator** attribute **checked**.
- Designate a PSE as the recipient of a TUOS or DUOS invoice backing sheet by adding an External System Identifier. Select the PSE from the Entity Manager tree under Business Entity | Purchasing-Selling Entity, then select the External Identifiers sub-tab. You will need to add a row for each identifier with the External System set to Irish T&D, the Identifier Type entered as DUOS or TUOS, and the External Identifier entered as the invoice recipient code.
- During the NI/ROI market harmonization, some TUOS and DUOS identifiers changed. If the identifiers change in the future, the external identifier for the PSE must also be updated. If it is not updated the invoice backing sheets will still be imported, but the retail settlement process cannot tie the backing sheet to the meter volumes.

2.5 System Settings

To fully support IE T&D functionality and to maintain adequate runtime performance of the load settlement and aggregation functions, some default system setting values must be changed. Similarly, system settings must be changed to prevent the application from automatically calculating usage factors (since they are imported from NQH/NHH meter data messages instead).

Login to the application as an administrative user or "super-user", click the "Admin" link in the home page tree, and then choose **Tools** > **Configuration** > **System Settings** from the application's main menu bar.

In the resulting view, find the following System Dictionary entries (top grid of this view) and change their values accordingly:

Path in Tree	Setting Name	Value
Global > System > GA Settings > Forecast/Settlement	Enable Summary Only Mode	TRUE
Global > Load Management	Accept Non-Incumbent Entity Load	TRUE
Global > Load Management > Usage Factors	Calculate Usage Factors on Consumption Import	FALSE

2.5.1 Static Data Date Validation

Another System Dictionary entry of interest is named Static Data Date Threshold. It is found in the tree at Global > MarketExchange > TDIE > Settings, and has a default value is 1. This setting controls a threshold/tolerance for dates in the static data not matching dates in NQH/NHH meter data messages. The threshold represents the number of days in the meter period for which a static data mismatch is allowed.

For example, an ROI 300 message is processed and indicates that MPRN 1234567890 has a load profile code of 07 and a DUoS Group of DG5. The previous read date for the registers is 1 May 2010 and the current read date for the file is 30 June 2010. With a threshold setting of 1 (the default), the processing logic will accept the static data as valid as long as the MPRN is active, has a valid supplier assignment, and has the correct load profile code and DUoS Group for 59 of the 60 days between the previous read date (*ex*clusive) and the current read date (inclusive). So if the static data indicates that the MPRN terminates (that is, becomes inactive) on 29 June 2010, the static data will still be considered valid.

Setting the threshold to zero will only process a message when the relationships and date ranges in the static data exactly match all relationships in the message. Setting the threshold to a value greater than 1 allows more lenient processing.

2.5.2 Market Harmonisation

Prior to the implementation of Market Harmonisation, Market Operations relied on the message type code to identify the jurisdiction of the message recipient: a message with a message type code of 341 would be associated with the ROI jurisdiction, while an N341 message type code would be associated with the Northern Ireland jurisdiction. By identifying the jurisdiction, the message's data structure could be interpreted correctly.

As one of the primary technical consequences of Market Harmonisation is removing differences in message type code between NI and ROI, other means of identifying either jurisdiction and pre-/post-harmonisation formatted messages, additional system dictionary entries are required to identify the go-live date for the NI Enduring Solution, and the schema version used for NI messages post-go-live.

Path in Tree	Setting Name	Value
Global > MarketExchange > TDIE > Harmonisation	NI Harmonisation Start Date	2012-05-21
Global > MarketExchange > TDIE > Harmonisation	NI Schema Version	10.00.00

In addition, any recipient identifiers (as contained in a MessageHeader/@RecipientID element attribute) must be entered as system label entries in System Settings under Global > MarketExchange > TDIE > Recipient List > NI (for recipients in Northern Ireland) or Global > MarketExchange > TDIE > Recipient List > ROI (for recipients in Ireland).

2.6 Application Server

The *Market Operations Implementation Guide for SEM* requires that the Market Exchange URL system setting be configured. This setting allows the application to properly connect to the MEX web application running on the Tomcat application server. This configuration is also required to facilitate bulk retrieval of meter data and aggregated demand data messages.

In addition to defining the correct URL in the application's System Settings view, additional configuration is required on the Tomcat application server for using the IE T&D functionality.

The Tomcat application server software is included with the application server setup. See the *Retail Operations* / *Market Operations Server Installation Guide* for details on configuring and running this software. The steps below will refer to the Tomcat installation folder as <*Tomcat*>. The steps below will refer to the current version of the application software as <*Version*>, and it will be a 4-digit number delimited with periods (like `5.0.2.6` or `5.1.0.7`).

- Locate the configuration root directory where the MEX web application is deployed:

  `<Tomcat>\webapps\mex<Version>\mexRoot`

- In this folder, create a folder named `msg-queue` if one does not already exist.
- Inside this `msg-queue` sub-folder, create a folder named `TDIEImport` if one does not already exist.
- This folder is where messages can be deposited in bulk for batch processing:

  `<Tomcat>\webapps\mex<Version>\mexRoot\msg-queue\TDIEImport`

  - It can be configured as a network share so that programs running on other machines can deposit them upon receipt from MRSO/ESBN and EMMA/NIE T&D.
  - Files deposited here *must* have either an XML or CSV file extension. CSV files are assumed to be in the CSV format published by NIE T&D with aggregated demand data. XML files must be in the appropriate format as published by MRSO/ESBN and EMMA/NIE T&D and must have a supported message type code.
    - Supported message type codes from MRSO/ESBN include 300, 300S, 300W, 305, 306, 306W, 307, 307W, 310, 310W, 320, 320W, 332, 332W, 341, 342, 591, 595, 596, and 598.
    - Supported message type codes from EMMA/NIE T&D include 300, 300S, 300W, 306, 307, 310, 320, 332, and 341.

Note: Only meter data and aggregated demand data can be imported in bulk using this facility.

2.7 System Tables

In the Retail Operations / Market Operations application, auditing is an opt-in function. By default, in a newly created application schema, auditing for all tables is disabled. An administrator must manually enable the tables that need to be audited.

For IE T&D functionality, auditing *must* be enabled for the **Schedule Data** table. Additionally, this table must be marked as "reactive" to support the use of other application functionality.

Follow these steps to enable auditing for this table:

1. Login to the application as an administrative user or "super-user"
2. Click the "Admin" link in the home page tree
3. Select the "Admin Entity Manager" tab.
4. From the tree, select **Security** > **System Table** > **Schedule Data**
5. In the resulting property page on the right, make sure that the checkbox attributes named *Audit Enabled?* and *Is Reactive?* are checked. Note that the *Is Reactive?* attribute will not be visible unless the *Audit Enabled?* attribute is checked.

2.8 Background Jobs

Once the application server is configured, you can enable a database background job that will monitor the incoming folder for batch processing and automatically import and archive all files found. This way no manual steps must be performed to keep data flowing into the system – message files can be programmatically deposited into the message queue folder configured above, and they will automatically be imported into the system.

Additional background jobs must be enabled to start an application function known as the Reactor. This function must be enabled so that SEM Net Demand schedules are automatically re-computed when calculation inputs are updated.

Follow these steps to enable the background jobs:

1. Login to the application as an administrative user or "super-user"
2. Click the "Admin" link in the home page tree
3. Choose **Tools** > **Background Job Status** from the application's main menu bar.
4. In the resulting view, select 'All Jobs' from the Job Owner selection in the upper-left.
5. In the Job Summary grid (top grid), select the row whose Context Name is **System Job**.
6. For each job that should be enabled, select the appropriate row in the Jobs grid (bottom grid), right-click, and choose **Enable Job**. Perform these steps to enable the jobs with the following names:
   - FETCH_TDIE_IMPORT_FILES_JOB
   - REACTOR_JOB
   - PROCESS_QUEUES_MONITOR_JOB
   - LOB_STAGING_CLEANUP_JOB

Chapter 3: Importing Message Files

The IE T&D functionality of Market Operations includes support for loading the following XML message formats from the MRSO/ESBN for meter data and aggregate demand data for the Republic of Ireland: 300, 300S, 300W, 305, 306, 306W, 307, 307W, 310, 310W, 320, 320W, 332, 332W, 341, 342, 591, 595, 596, and 598.

The functionality also supports the following XML formats from EMMA/NIE T&D for meter data for Northern Ireland: 300, 300S, 300W, 306, 307, 310, 320, 332, and 341. Additionally, the application can import a CSV format from NIE that reports aggregated demand data (equivalent to the data present in ROI 591, 595, 596, and 598 XML messages).

3.1 Prerequisites

Static data for all MPRNs must be defined and loaded into the system before any meter data can be processed for those MPRNs. The files can still be imported with missing or incorrect static data, but they will need to be re-processed once the static data is imported/corrected.

See *Retail Operations Load Aggregation Implementation Guide for SEM* for more details on the static data requirements.

The SEM Settlement/Revision Calendar must be populated and should be up-to-date *before* importing aggregated demand data message files.

3.2 Using Data Exchange

The message files are loaded into the application using the Data Exchange feature:

1. Login to the application
2. From the home page menu, select the following option: **SEM Operations** > **IE T&D** > **Market Messages**
3. From the application main menu, select **Run** > **Data Exchange**.

The Data Exchange dialog will have numerous options in the Exchange Type drop-down that include both SEM and IE T&D data exchange functions. The following two options are used to import message files:

- **IE T&D: Import Message File**

  This option allows you to manually import a single file as long as it is one of the supported message formats described above. Simply select a file using the **Import File Name** field. The button labeled "**…**" can be used to browse for a file from your local file system.

  When you click the **Run** button, the selected file will be imported. Upon completion, a message will be shown indicating whether the file import was successful or not.

  If the message shown is a **simple message dialog** that indicates the process finished -- *even if it indicates that the process encountered warnings or errors* -- then the file was **successfully loaded**. Warnings or errors can be viewed in the Process Log (see section 3.4 Viewing the Process Log for additional details). Errors in this case indicate that the file was imported but cannot be successfully imported into the Retail Operations internal data model (for retail load aggregation) without user intervention. The screens for viewing the imported messages can be used to re-process these messages once a user has corrected the errors.

  If a **run-time error dialog** is shown (it will include an error code and a "Details" button with a large amount of information for diagnosing the issue), then the file was **not** successfully loaded. This could

be the case if the file is corrupted or incomplete or if any unexpected or catastrophic database exceptions occur.

- **IE T&D: Fetch All Files**

  This option allows you to manually load all files that have been loaded into the message queue folder on the application server.

  It is not generally necessary to use this Data Exchange option as these messages will be automatically loaded on a periodic basis via a background job.

  The Process Log can be used to view errors that occurred. If any file *cannot be imported* then a message to that effect will appear in the Process Log and the file will be sent back to the application server into a special folder for erroneous files – the Error Queue.

3.3 The Error Queue

When a file is retrieved from the application server via the **IE T&D: Fetch All Files** Data Exchange option or automatically via scheduled background job, files that cannot be loaded are sent back to the application server.

These files can be viewed by an administrator that is logged on to the application server. The files will be in the following folder:

`<Tomcat>\webapps\mex<Version>\mexRoot\msg-queue\TDIEImportErrors`

Where <*Tomcat*> represents the Tomcat installation folder (such as `C:\Tomcat`) and <*Version*> represents the current version of the application software (such as `5.0.2.6` or `5.1.0.7`).

The Process Log can be used to ascertain the reason a particular file is rejected. Files rejected due to unexpected database errors may be moved back into the incoming message queue and re-imported. But files rejected due to other issues, including application configuration problems or file format problems, will require corrective action before attempting to re-import.

3.4 Viewing the Process Log

When a Data Exchange option completes normally but has encountered warnings or errors, the Process Log for that import process will automatically be shown so that the user can view the warnings or errors that occurred.

Alternatively, the user can view the Process Log at any time to view events from any process that the system has executed. To open the Process Log, follow these steps:

1. Login to the application
2. From the home page menu, select the following option: **SEM Operations** > **IE T&D** > **Market Messages**
3. From the application main menu, select **Tools** > **Logs**
4. The first tab will the Process Log and will be selected when the window opens.

3.4.1 Report Filters

The Process Log view has several report filters on the left-hand side of the window.

- **Date Range:** The day or days on which the process occurred. This filter will default to "today".
- **Include User Sessions and Jobs:** This flag controls whether or not user sessions and background jobs are shown in the log. In cases where errors prevented a process from actually starting, it may be necessary to check this box and examine these entries. But, for the most part, it will not be necessary to check this box.
- **Process Name:** Enter search criteria for finding processes with matching names and click the **Search** button. Enter a percent, "%", to indicate wildcard search. In the list below, select one or more processes to view or select the very top selection in the list named *<All>*
  - Search for processes named **Import IE T&D Market Messages** to view the log entries created by running the Data Exchange option **IE T&D: Import Message File**.
  - Search for processes named **Fetch IE T&D Market Message Files** to view the log entries created from both running the Data Exchange option **IE T&D: Fetch All Files** and from the background job that automatically fetches and imports these files.
- **Process Owner:** This filter indicates the user that executed the process. To find processes run by particular users, select their user name from this list. The top-most item in the drop-down is *<All>* and will show results for all users.

  Note: The background job that automatically fetches files from the application server run as "System".

- **Process State:** This filter allows you to view only currently running jobs or only completed jobs. The default option, "All", shows all process – running or not.

3.4.2 Processes Grid

After setting up the report filters, you can refresh the report using the **Refresh** toolbar button or selecting **View** > **Refresh** from the window's main menu bar.

The Processes grid, on top, will show a list of all processes that match the selected criteria. If the process has completed, the **Status** and **Process Finish Text** will indicate the final disposition of the process. If the process aborted, the **Error** field will also indicate an error message that caused the process to die.

For **Import IE T&D Market Messages** processes, the **Target Parameters** column will indicate the full path to the file that was imported.

3.4.3 Process Log Grid

Selecting a row/process in the Processes grid will show its associated log messages in the bottom Process Log grid. This can be used to review any warnings or errors that occurred during the process.

If the left-most column of the Process Log grid shows an asterisk for a particular row then a user can right-click on that row and select **View Attachments** to see additional information attached to the log message.

If the second left-most column of the Process Log grid shows an arrow (->) then a user can right-click on that row and select **View Message Details** for additional static information pertaining to the log message.

When viewing the Process Log for an **Import IE T&D Market Messages** process, the presence of a "Fatal" error indicates that the file was not imported. However, if the most severe message is an "Error" then the file was imported but could not be processed. Other functions in the application can be used to re-process the file once the error is corrected. See sections 5.3 Meter Data Messages (3xx) and 5.4 NI Meter Data Messages (3xx) for more details on how to re-process messages.

When viewing the Process Log for a **Fetch IE T&D Market Message Files** process, if an "Error" message is followed by "Info" messages indicating a file is being sent to a message queue, then the file was not processed but instead sent to the error queue on the application server. If no such "Info" messages are present for a particular file import but "Error" messages are present then the file was imported but could not be processed.

Note: Due to technical limitations in the way errors are raised and handled in Oracle RDBMS, you may see the same error message repeated in the error log – particularly if they are the last events in the log and ultimately resulted in a fatal error.

Chapter 4: Processing Message Files

As meter data and aggregated demand data messages are imported into the system, they are processed into the internal Retail Operations data model. Once processed, the data can be used for other functions like load aggregation, scheduling, and shadow settlements.

The following sections describe how the various message files are imported into the system and what downstream functions depend on this processing.

4.1 Processing Aggregated Demand Data Message Files

Aggregate demand data messages are used to compute net demand schedule data and to support the SEM Settlement Validation view.

Message type codes 591, 595, and 598 are never processed into the Retail Operations data model. The one downstream function that requires them – SEM Settlement Validation – queries data directly from the raw data store as needed. The NIE CSV file contains analogous information for Northern Ireland and is treated the same way: no processing is required, and the SEM Settlement Validation report queries data as needed directly from the raw data store. See SEM Settlement Validation for more details on the SEM Settlement Validation report.

One action is taken upon importing files with a message type code of 598: if no service point exists that corresponds to the specified EARN ID then one will be created. The NIE CSV file that contains analogous information for Northern Ireland is treated similarly – a service point will be created, if necessary, to represent the aggregated non-participant generation for the supplier unit indicated in the file.

Message type code 596 is processed into a Net Demand schedule for a supplier unit. The NIE CSV file that contains analogous information for Northern Ireland is treated similarly – the net demand quantities are stored in a Net Demand schedule. These schedule values are used in SEM Settlement Validation view to compare the net demand values used in SEM settlements to the net demand values published by MRSO/ESBN and NIE. See SEM Settlement Validation for more details on the SEM Settlement Validation report.

The SEM Settlement Calendar is used to map the Settlement Run Indicator field of the message to a Statement Type, which is a required field when storing a schedule. **Note** that 596 message data are processed into *IE T&D* statement types. See section 4.3 Statement Types and the SEM Settlement Calendar.

Appendix A: Aggregated Demand Data Exceptions contains a complete list of exceptions and warnings that may be encountered when importing/processing aggregated demand data messages.

4.2 Processing Meter Data Message Files

Meter data messages are used to during load aggregation functions to shadow the calculations of net demand schedule data.

4.2.1 Interval Meter Data

Meter data for QH MPRNs in the Republic of Ireland and HH MPRNs in Northern Ireland are imported via XML message with type codes of 341 and 342.

The processing of these files performs two steps:

1. Import the data into the Retail Operations data model for Meter Channel time-series volumes.
    - Meter Channels represent multiple streams of time-series data associated with a single meter.
2. Compute the net KWH and store into the Retail Operations data model for Interval Meter time-series volumes.
    - Interval Meter data represents the time-series net usage volumes for a single meter. These are calculated by converting the time-series data for KW meter channels to KWH and netting them by interval.
    - To compute KWH values, KW values are divided by 2 for HH meters and by 4 for QH meters.

To improve system performance when importing large amounts of interval meter data, the processing of losses on meter data can be turned off. To do so, change the value of following System Dictionary entries accordingly:

Path in Tree	Setting Name	Value
Global > MarketExchange > TDIE > Settings	Skip Processing Of Losses For Import Of Actual Meter Data	1
Global > System > GA Settings > Forecast/Settlement	Enable Actual Losses Recalc.	TRUE

These settings will defer the calculation of losses on actual meter data to the Final settlements step. In most cases, Final settlements need never be run for IE T&D functionality. Instead, **backcast** settlement types are used to perform the required load aggregation functions, and the backcast logic always calculates losses. If processing of an interval meter data message fails, there are screens in the user interface that can be used to re-process the data once corrective action has been taken to address the reason for failure. See section 5.5 Re-Processing Messages for more detail.

Additionally, interval meter data can be processed using "Point in Time" re-processing. This allows users to process into the Retail Operations data model only the meter data available at a particular point in time in the past. This mechanism is used prior to executing a load aggregation to insure that the correct version of meter data is used in the load aggregation calculations. See section 5.7 Point in Time Re-Processing for more detail.

Once successfully processed, the resulting data in the Retail Operations data model can be viewed using the Meter Data report:

1. Log on to the application
2. From the home page tree, select **Data Management** > **Accounts and Meters** > **Meter Data**
3. Set the toolbar **Begin** and **End Dates** to indicate the date range of interval data in which you are interested.

4. Set the report filters:
   - **Interval:** choose **15 Minute for ROI meters** or **30 Minute for NI meters**
   - **Meter Code:** choose **Actual**
   - **Account and Meter Tree:** Choose the applicable **Account**, **Service Location** (both correspond to MPRN), and **Meter** (corresponds to meter serial number) from the tree. Optionally, you can use the **Find** toolbar button (or **Edit** > **Find** from the main menu) to search for the meter.
5. Selecting an item in the tree will automatically refresh the data grid. You can also explicitly refresh the data grid using the Refresh toolbar button (or **View** > **Refresh** from the main menu).
6. The Net column for the meter will indicate the net KWH per interval that was calculated during processing. This value will contribute to the total demand during the load aggregation calculations.

4.2.2 Non-Interval Meter Data

Meter data for NQH MPRNs in the Republic of Ireland and NHH MPRNs in Northern Ireland are imported via XML message with type codes of 300, 300S, 300W, 305, 306, 306W, 307, 307W, 310, 310W, 320, 320W, 332 and 332W.

The processing for all of these files *except for withdrawal messages* performs two steps:

1. Import the consumption data into the Retail Operations data model for Period Meter consumption volumes.
   - Period (non-interval) meter data does not allow for the use of meter channels. Instead, consumption data can be tagged with a unit of measure.
2. Import the usage factor data into the Retail Operations data model for Meter Usage Factors.

The processing for withdrawal messages performs the following steps:

1. Lookup the corresponding withdrawn 3XX message.
   - In the Republic of Ireland:
     - 300W withdraws: 300, 300S, and 305 messages
     - All other withdrawal messages withdraw the matching message code – for example, a 306W withdraws a 306 message.
   - In Northern Ireland:
     - 300W withdraws all 3XX messages: 300, 300S, 306, 307, 310, 320, and 332.
   - If no corresponding message is found, or if it is found but was never successfully processed, do not process the withdrawal.
2. Mark corresponding consumption data in the Retail Operations data model as "Ignored".
3. Mark corresponding usage factors in the Retail Operations data model as "Withdrawn".
   - Usage factor assignments in the Retail Operations data model support Scenario+Case functionality.
   - Withdrawing a usage factor moves that assignment to a case named "Withdrawn".
   - The "Base" case usage factor is what will be used in load aggregation calculations.

If processing of a non-interval meter data message fails, there are screens in the user interface that can be used to re-process the data once corrective action has been taken to address the reason for failure. See section 5.5 Re-Processing Messages for more detail.

Once successfully processed, the resulting usage factor data in the Retail Operations data model can be viewed using the Account and Meter Details report:

1. Log on to the application
2. From the home page tree, select **Data Management** > **Accounts and Meters** > **Account and Meter Details**
3. Set the toolbar **Begin** and **End Dates** to indicate the date range of loss factor assignments in which you are interested.
4. Choose the applicable **Account**, **Service Location** (both correspond to MPRN), and **Meter** (corresponds to meter serial number) from the tree. Optionally, you can use the Find toolbar button (or **Edit** > **Find** from the main menu) to search for the meter.
5. Selecting an item in the tree will automatically refresh the property page to the right for the selected meter. You can also explicitly refresh the data grid using the Refresh toolbar button (or **View** > **Refresh** from the main menu).
6. On the **Usage Factors tab** at the bottom of the property page, usage factor details will be shown.
   - The **Template** column indicates the meter type and should correspond to either 24H or Day/Night meter types.
   - The **Begin Date** and **End Date** columns indicate the date range for which the assignment is applicable.
   - The **Period Usage Details** summarizes the usage factor values, indicating a time of use period and its corresponding usage factor value. Right-click on a cell and select **Edit Period Usage Factors** to see the details in a grid or to make any manual changes.
7. The "Base" case usage factors will be applied to the meter's profile shape (for which the assignment can be viewed on the Load Model tab) during load aggregation calculations.

4.2.3 Exceptions

See Appendix B: Meter Data Exceptions for a complete list of exceptions and warnings that may be encountered when importing/processing meter data messages.

Many of the validation checks made when processing messages into the Retail Operations data model are subject to a configurable "date threshold" that can make the system more or less strict when it comes to processing messages where mismatches with static data are identified. See section 2.5.1 Static Data Date Validation for more information.

4.3 Statement Types and the SEM Settlement Calendar

The SEM Settlement/Revision Calendar tracks the publication dates for the various SEM settlement statements and invoices, including ad-hoc and timed (M+4 and M+13) resettlements.

The aggregated demand data files include a Settlement Run Indicator field, which, when combined with the information in the SEM Settlement/Revision Calendar, allows the system to accurately determine to which SEM statement an aggregated demand data file corresponds.

ROI Indicator	NI Indicator	SEM Statement
10	D+1	Indicative
20	D+4	Initial
30	M+4	Revision *
40	M+13	Revision *
50	ADHOC	Revision *

* For the M+4, M+13, and ad-hoc resettlements, the revision number of the SEM statement is determined using the Settlement/Revision Calendar.

Consider the example where there are a total of six SEM settlement revisions for a particular operating day – March 10th, 2008:

SEM Statement	Published On	Note
Indicative – P	3/11/2008	
Initial – F	3/14/2008	
Revision #1 – F(1)	5/16/2008	Ad-hoc resettlement
Revision #2 – F(2)	7/14/2008	M+4 resettlement
Revision #3 – F(3)	4/13/2009	M+13 resettlement
Revision #4 – F(4)	6/18/2009	Ad-hoc resettlement

In this case, if the system were to import an aggregated demand data message for ROI with a settlement run indicator of 30, the data will be processed into a schedule for the Revision #2 statement type.

Also in this case, if the system were to import an aggregated demand data message for NI with a settlement run indicator of ADHOC, the processing will examine the market timestamp of the NI message. If the timestamp is on or before 5/16/2008, the data will be processed into a schedule for the Revision #1 statement type. If the timestamp is later than that, the system assumes this ADHOC data corresponds to the second ad-hoc resettlement and processes it into a schedule for the Revision #4 statement type.

There are actually **four** "flavors" of schedule data that are used with IE T&D functionality and SEM shadow settlements:

1. **Internal:** The internal statement types are those used for full shadow settlements.
   - The names of these statement types have no prefixes:
     - Indicative, Initial, Revision #1, Revision #2, etc.
   - These statements are generated during shadow settlements and have a statement *state* of Internal.

- The source of volumetric determinants for supplier units is the load aggregation function of Retail Operations.
  - The supplier unit net demand schedules must be calculated prior to executing shadow settlements. See section 6.3 Calculation Process for more information.

2. **External:** The external statement types are those used to represent the market settlement statements.
   - The names of these statement types have no prefixes. They are the same statement types as used for internal statements:
     - Indicative, Initial, Revision #1, Revision #2, etc.
   - These statements are imported from the SMO and have a statement *state* of External.
   - All determinants, including volumetric determinants for supplier units, are imported from PIR files published by the SMO.
3. **SMO:** The SMO statement types are those used for *business rule* shadow settlements. This is used to verify that the statements published by the SMO are arithmetically consistent with the determinants published in PIR files by the SMO.
   - The names of these statement types have a prefix of SMO:
     - SMO Indicative, SMO Initial, SMO Revision #1, SMO Revision #2, etc.
   - These statements are generated during shadow settlements and have a statement *state* of Internal.
   - The source of volumetric determinants is the set of corresponding PIR files published by the SMO.
     - The **SEM: Copy PIR Data to Internal Transactions** Data Exchange option must be executed before running shadow settlement calculations.
4. **IE T&D:** The IE T&D statement types are those used for comparing/verifying SEM determinants against the net demand data published by MRSO/ESBN and NIE.
   - The names of these statement types have a prefix of T&D IE:
     - T&D IE Indicative, T&D IE Initial, T&D IE Revision #1, T&D IE Revision #2, etc
   - These statements are generated during shadow settlements and have a statement *state* of Internal.
   - The source of volumetric determinants for supplier units is the aggregated demand data (message type code 596) published by the MRSO/ESBN and NIE.
     - NI CSV files and ROI 596 message type code files must be imported and successfully processed prior to running shadow settlements.

Chapter 5: Viewing Imported Message Files

The application includes four reports for viewing the contents of the meter data and aggregated demand data message files that have been imported.

On import, the messages are imported into tables in the database that mirror the structure of the original messages. These views provide access to those raw structures and allow users to see the contents of the XML (or CSV) files in an intuitive user interface:

1. Login to the application
2. From the home page tree, select **SEM Operations** > **IE T&D** > **Market Messages**
3. In the Report drop-down, you will see five reports, four of which are described below in the following four sections. The name of each section below corresponds to the report it describes.

5.1 Aggregated Meter Data (59x)

The first report in the list allows you to view the aggregated demand data messages published by MRSO/ESBN. These are XML messages with message type codes of 591, 595, 596, and 598.

The report requires users to select values for the following report filters:

- **File Type:** corresponds to the message type code in the XML file – 591, 595, 596, or 598
- **Jurisdiction:** limits views to volumes related to either Northern Ireland (NI) or Ireland (ROI) supplier units.
- **Supplier Unit:** Select "<All>" (the default option) to show volumes related to all supplier units for the selected jurisdiction. The list of supplier units will be limited to those in the selected jurisdiction.
- **Settlement Run Indicator:** 10, 20, 30, 40, or 50 – corresponding to D+1, D+4, M+4, M+13, or Ad-hoc settlement statements

If the selected file type is 598 then the user can also choose a Generator Name / EARN ID. The user can choose <*All*> for this filter to view data for all applicable generators. The button labeled **Check NPG to SU Mapping** executes a validation process to verify that each non-participant generator service point (corresponding to EARN IDs in ROI and to aggregate non-participant generation by supplier unit in NI) is associated to one and only one supplier unit. This limitation on how generators are mapped to supplier units is required in order to correctly calculate the contribution of non-participant generation to the Net Demand for a supplier unit. See section 6.2.1 EARN ID/MPRN/SU Mapping for more information.

After selecting values for the filters, refresh the report with the toolbar **Refresh** button (or select **View** > **Refresh** from the main menu).

Upon refresh, the data grid will be populated with the time-series data that was contained in all matching messages for the selected filter values and toolbar date range.

- Interval data grids always show time/intervals vertically.
- When viewing 598 data, if multiple generators match the selected criteria, they will be shown in multiple columns.
- When viewing 591 data, sub-summary data for each load profile code will be shown in multiple columns.

- When viewing 591 or 595 data, a column named Under Review is shown. A checked box indicates that this record has been flagged.
  - Users can check or uncheck the box and then save the changes from this report to mark or unmark items as needing review.
  - This flag can also be set when viewing these numbers from the SEM Settlement Validation report. See section 7.3.4 Energy Volume Details for more details.

5.2 NI Aggregated Messages (5xx)

This report allows you to view the aggregated demand data messages published by NIE. These are CSV messages that include data analogous to that found in the ROI 591, 595, 596, and 598 messages.

The report requires users to select values for the following report filters:

- **Demand Type:** choose the type of data to view. The various options will show data from the CSV files that are analogous to the various ROI XML message type codes.
  - **N591:** This option shows aggregated non-interval MPRN demand by supplier unit
  - **N595:** This option shows aggregated interval MPRN demand by supplier unit
  - **N598:** This option shows aggregated non-participant generation by supplier unit
- **Supplier Unit:** can choose <*All*>
- **Settlement Run Indicator:** D+1, D+4, M+4, M+13, or Ad-hoc
- Options
  - **Show Detail:** When this checkbox is checked, the grid will show detailed results, aggregated by Loss Factor and UoS Tariff (and by Load Profile Code for N591 demand type). When this box is not checked, the data will be summarized by supplier unit.
  - **Load Profile:** If showing details and showing N591 demand data, the results shown in the grid can be filtered to only show results corresponding to one or more load profile code. Multiple options can be selected from this list, and there is an <*All*> option.
  - **Loss Factor:** If showing, the results shown in the grid can be filtered to only show results corresponding to one or more loss factor codes. Multiple options can be selected from this list, and there is an <*All*> option.
  - **UoS Tariff:** If showing, the results shown in the grid can be filtered to only show results corresponding to one or more UoS tariff code. Multiple options can be selected from this list, and there is an <*All*> option.

After selecting values for the filters, refresh the report with the toolbar **Refresh** button (or select **View** > **Refresh** from the main menu).

Upon refresh, the data grid will be populated with the time-series data for the selected demand type that was contained in all matching CSV message files for the selected filter values and for the toolbar date range.

- Interval data grids always show time/intervals vertically.
- When viewing 591 or 595 data and *not* showing details (that is, displaying results at a supplier unit level of aggregation), a column named Under Review is shown. A checked box indicates that this record has been flagged.
  - Users can check or uncheck the box and then save the changes from this report to mark or unmark items as needing review.
  - This flag can also be set when viewing these numbers from the SEM Settlement Validation report. See section 7.3.4 Energy Volume Details for more details.

5.3 Meter Data Messages (3xx)

This report allows you to view the meter data messages published by MRSO/ESBN and, for messages published after Enduring Solution go-live, EMMA/NIE. Users should first select an option for the report filter named Meter Type.

5.3.1 Period Meter Type

This option allows you to view imported XML messages with message type codes of 300, 300S, 300W, 305, 306, 306W, 307, 307W, 310, 310W, 320, 320W, 332, or 332W.

The report requires users to select values for the following report filters:

- **Show Exceptions Only:** When this box is checked, only error records are shown in the grid. These are records that were imported but could not be processed into the Retail Operations data model.

  Note: Error records that have been marked as "Ignored" will *not* be shown when this box is checked.

- **Load Profile Code:** This option filters the set of messages to only show files that correspond to the selected load profile code. There is an <*All*> option.
- **DUoS Group:** This option filters the set of messages to only show files that correspond to the selected DUoS group. There is an <*All*> option.
- **MPRN:** Enter search criteria to only show files for MPRNs that. Enter a percent, "%", to indicate wildcard search. Click the **Search** button (or use the toolbar **Refresh** button) to populate the report grids and apply the search criteria.
- **Detail Type:** Select the Usage Factor radio button to display actual and estimated usage factors per timeslot code reported in the selected message. Select the Consumption radio button to display consumption amounts per meter and register type for the selected message.

After selecting values for the filters, refresh the report with the toolbar Refresh button (or select **View** > **Refresh** from the main menu).

Upon refresh, the Messages grid (top grid) will enumerate all meter data messages imported that match the specified criteria and whose read date occurred during the date range selected in the toolbar.

- Rows formatted with bold text and with a red background are exception records and were not successfully processed into the Retail Operations data model.
  - The Error Message column will indicate the problem. See Appendix B: Meter Data Exceptions for a complete list of possible exceptions during processing.
- Rows will be formatted with *unbolded* text and with a *slightly* red background are *ignored* exception records. These are exception records that were previously marked as ignored by a user.

On selection of a message in the top grid, the bottom grid – which will be labeled either Usage Factors or Consumption, depending on the selected detail type – will show the contents of the message.

If the begin data in the toolbar is prior to the start date for NI Harmonisation (configured under System Settings, Global > MarketExchange > TDIE > Harmonisation > NI Harmonisation Start Date), the grid label text "Check NI Meter Data Messages report for pre-harmonisation messages" will be shown. Any message with a MessageHeader/@Version number less than the value of the System Setting Global > MarketExchange > TDIE > Harmonisation > NI Schema Version will be displayed on the NI Meter Data Messages report.

5.3.2 Interval Meter Type

This option allows you to view imported XML messages with message type codes of 341 or 342.

The report requires users to select values for the following report filters:

- **Show Exceptions Only:** When this box is checked, only error records are shown in the grid. These are records that were imported but could not be processed into the Retail Operations data model.

  Note: Error records that have been marked as "Ignored" will *not* be shown when this box is checked.

- **MPRN:** Enter search criteria to only show files for MPRNs that. Enter a percent, "%", to indicate wildcard search. Click the **Search** button (or use the toolbar **Refresh** button) to populate the report grids and apply the search criteria.

After selecting values for the filters, refresh the report with the toolbar Refresh button (or select **View** > **Refresh** from the main menu).

Upon refresh, the Messages grid (top grid) will enumerate all meter data messages imported that match the specified criteria and whose read date occurred during the date range selected in the toolbar.

- Rows formatted with bold text and a red background are exception records and were not successfully processed into the Retail Operations data model.
  - The Error Message column will indicate the problem. See Appendix B: Meter Data Exceptions for a complete list of possible exceptions during processing.
- Rows will be formatted with *unbolded* text and a *slightly* red background are *ignored* exception records. These are exception records that were previously marked as ignored by a user.

On selection of a message in the top grid, the Interval Details grid (bottom grid) will show the contents of the message.

If the begin data in the toolbar is prior to the start date for NI Harmonisation (configured under System Settings, Global > MarketExchange > TDIE > Harmonisation > NI Harmonisation Start Date), the grid label text "Check NI Meter Data Messages report for pre-harmonisation messages" will be shown. Any message with a MessageHeader/@Version number less than the value of the System Setting Global > MarketExchange > TDIE > Harmonisation > NI Schema Version will be displayed on the NI Meter Data Messages report.

5.4 NI Meter Data Messages (3xx)

This report allows you to view the meter data messages published by NIE prior to the start date for NI Harmonisation. Users should first select an option for the report filter named Meter Type.

5.4.1 NHH Meter Type

This option allows you to view imported XML messages with message type codes of 300, 300S, 300W, 306, 307, 310, 320, or 332.

The report requires users to select values for the following report filters:

- **Show Exceptions Only:** When this box is checked, only error records are shown in the grid. These are records that were imported but could not be processed into the Retail Operations data model.

  Note: Error records that have been marked as "Ignored" will *not* be shown when this box is checked.

- **Load Profile Code:** This option filters the set of messages to only show files that correspond to the selected load profile code. There is an <*All*> option.
- **DUoS Group:** This option filters the set of messages to only show files that correspond to the selected DUoS group. There is an <*All*> option.
- **MPRN:** Enter search criteria to only show files for MPRNs that. Enter a percent, "%", to indicate wildcard search. Click the **Search** button (or use the toolbar **Refresh** button) to populate the report grids and apply the search criteria.

After selecting values for the filters, refresh the report with the toolbar Refresh button (or select **View** > **Refresh** from the main menu).

Upon refresh, the Messages grid (top grid) will enumerate all meter data messages imported that match the specified criteria and whose read date occurred during the date range selected in the toolbar.

- Rows formatted with bold text and a red background are exception records and were not successfully processed into the Retail Operations data model.

  The **Error Message** column will indicate the problem. See Appendix B: Meter Data Exceptions for a complete list of possible exceptions during processing.
- Rows will be formatted with *unbolded* text and a *slightly* red background are *ignored* exception records. These are exception records that were previously marked as ignored by a user.

On selection of a message in the top grid, the Consumption grid (bottom grid) will show the contents of the message.

5.4.2 HH Meter Type

This option allows you to view imported XML messages with message type codes of 341 or 342.

The report requires users to select values for the following report filters:

- **Show Exceptions Only:** When this box is checked, only error records are shown in the grid. These are records that were imported but could not be processed into the Retail Operations data model.

  Note: Error records that have been marked as "Ignored" will *not* be shown when this box is checked.
- **MPRN:** Enter search criteria to only show files for MPRNs that. Enter a percent, "%", to indicate wildcard search. Click the **Search** button (or use the toolbar **Refresh** button) to populate the report grids and apply the search criteria.

After selecting values for the filters, refresh the report with the toolbar Refresh button (or select **View** > **Refresh** from the main menu).

Upon refresh, the Messages grid (top grid) will enumerate all meter data messages imported that match the specified criteria and whose read date occurred during the date range selected in the toolbar.

- Rows formatted with bold text and a red background are exception records and were not successfully processed into the Retail Operations data model.
  - The Error Message column will indicate the problem. See Appendix B: Meter Data Exceptions for a complete list of possible exceptions during processing.
- Rows will be formatted with *unbolded* text and a *slightly* red background are *ignored* exception records. These are exception records that were previously marked as ignored by a user.

On selection of a message in the top grid, the Interval Details grid (bottom grid) will show the contents of the message.

5.5 Re-Processing Messages

When an exception occurs during processing of a message, user action will need to be taken to correct the situation – typically requiring a correction/update to static data. Once a correction is applied, you can then re-process the message without having to re-import the file. You may also need to re-process a message that has already successfully processed (for example, if manual data entry mistakenly overwrites information imported from the meter data message file).

For both NI and ROI reports and for both period and interval meter types, simply select a record or a range of multiple records in the Messages grid, right-click, and choose **Process Selected Messages**. This will process the message into the Retail Operations data model. If the file has already been successfully processed, it will be re-processed.

When messages are processed this way from the user interface, a process entry is created in the Process Log named **Process IE T&D Meter Data Messages**. Any further processing errors or warnings encountered will be logged here.

5.6 Ignoring Errors

Instead of re-processing an exception record, you may choose to instead ignore the error so that it doesn't show up in the "Show Exceptions Only" view.

For period or interval meter messages, select the exception record in the Messages grid (using normal cell selection), right-click, and choose **Ignore This Error**. To mark multiple records as ignored in bulk, select multiple records (dragging the mouse to select more than one row), right-click, and choose **Ignore All Selected Errors**.

5.7 Point in Time Re-Processing

Interval data messages can be re-processed using a Point in Time processing method.

This may be necessary for more accurate shadow calculations during load aggregation. For example, you have received 341 messages that post-date the Initial (D+4) settlement, but you need to re-run the load aggregation for Initial settlements. In this case, if you simply run the load aggregation, you will be incorporating meter data that is more recent than should be considered for Initial settlements.

Note: Once "Point in Time Re-Processing" is executed for a particular jurisdiction (ROI vs. NI) and range of days, you *must* perform "Point in Time Re-Processing" again for that jurisdiction and range of days to restore the interval meter data in the Retail Operations data model back to "now" for future load aggregation calculations.

For interval meter messages you will see an area under the report filters labeled **Re-process Messages**. The "As Of" date represents the point in time up-to-which messages will be imported. Any 341/342 messages with a market timestamp *after* the specified point in time will be ignored, and only older messages are re-processed. After selecting the date, click the Re-process button.

When messages are re-processed from a particular point in time, a process entry is created in the Process Log named **Re-process IE T&D Meter Data Messages**. Any processing errors or warnings encountered will be logged here.

Chapter 6: Calculation of Supplier Unit Net Demand

Net demand schedules for SEM supplier units are calculated using the following formula:

$NDLF_{SU,D,I} = V300_{SU,D,I} + V341_{SU,D,I} + V342_{SU,D,I}$

Given:

$V300_{SU,D,I} = \sum_{PSG\ in\ SU} (LA_{PSG,D,I})$

$V341_{SU,D,I} = \sum_{IISG\ in\ SU} (LA_{IISG,D,I})$

$V342_{SU,D,I} = \sum_{IESG\ in\ SU} (LA_{IESG,D,I})$

Where:

- **SU** is a SEM Supplier Unit
- **D** is a settlement day
- **I** is a half-hourly settlement interval
- **PSG in SU** represents the *period*-metered (non-interval) Schedule Groups associated with the given Supplier Unit
- **IISG in SU** represents the *interval*-metered *import* Schedule Groups associated with the given Supplier Unit. *Import* Schedule Groups are those whose service points are the SEM Supplier Units.
- **IESG in SU** represents the *interval*-metered *export* Schedule Groups associated with the given Supplier Unit. *Export* Schedule Groups are those whose service points are Non-Participant Generation Points (corresponding to EARN IDs in ROI or to aggregate non-participant generation by Supplier Unit in NI) that are assigned to the given SEM Supplier Unit.
- **$LA_{SG,D,I}$** is the total accepted schedule volume from load aggregation results for the specified Schedule Group, Day, and Interval. **Note** that the volumes for *export* Schedule Groups should be negative. Volumes for *import* Schedule Groups should be positive.
- **$NPG_{G,D,I}$** is the total non-participant generation volume for the specified Generator, Day, and Interval
- **$V300_{SU,D,I}$** is the total demand of NQH/NHH MPRNs for the specified Supplier Unit, Day, and Interval. This is analogous to the data in 591 aggregated demand data messages.
- **$V341_{SU,D,I}$** is the total demand of QH/HH MPRNs for the specified Supplier Unit, Day, and Interval. This is analogous to the data in 595 aggregated demand data messages.
- **$V342_{SU,D,I}$** is the total non-participant generation volume for the specified Supplier Unit, Day, and Interval. This value will be negative.
- **$NDLF_{SU,D,I}$** is the loss-adjusted net demand volume for the specified Supplier Unit, Day, and Interval. This is analogous to the data in 596 aggregated demand data messages and is the value used in SEM settlements for the supplier unit.

As input schedule values (load aggregation results and non-participant generation volumes) are imported or are changed, a background job will execute frequently (every minute) to automatically calculate/synchronize the net demand schedules.

The automatic calculations will properly populate these schedules as long as the following conditions are met:

- Load aggregation calculations must be performed and then accepted into schedules *for the appropriate statement type*.
- All non-participant generation points must be mapped to one and only one SEM Supplier Unit for the settlement day(s) in question.

6.1 Load Aggregation Functions

Before executing a load aggregation, *all* applicable meter data messages must be *successfully* imported and processed. It may be necessary to perform "Point in Time" re-processing to insure that the correct versions of meter data are used in the aggregation. See section 5.7 Point in Time Re-Processing for more information.

For more information on how to configure and subsequently execute a load aggregation, how to examine/analyze the results, and how to accept the results into schedules, see *Retail Operations Load Aggregation Implementation Guide for SEM*.

Note: Net demand calculations are sensitive to statement types. If you accept load aggregation results using the Indicative settlement type, these are inputs to the net demand calculations for the Indicative loss-adjusted net demand. Automatic calculations are limited to the supplier unit(s), statement type(s), and settlement intervals that require recalculation, depending on what load aggregation results are accepted.

6.2 Non-Participant Generation

In order to correctly calculate the contribution/impact of non-participant generation on net demand, the generators must be assigned to SEM supplier units.

This mapping is indirectly defined by the static data for export MPRNs, and is composed of the following relationships:

- All MPRNs for which export interval volumes are imported (from 341, 342, or N341 XML messages) will be associated with a non-participant generation point.
  - Each MPRN is represented by an Account in the Retail Operations data model.
  - Each Meter assigned to the Account has a Schedule Group assignment.
  - This Schedule Group's service point must be the non-participant generation point for this MPRN.
  - For ROI export sites, this Schedule Group assignment will effectively relate an MPRN to its corresponding EARN ID.
  - For MPRNs with more than one meter serial number, all meters should be assigned to the same generation point by way of these Schedule Group assignments.
- All such MPRNs must also be associated with a Supplier Unit
  - The Account in the Retail Operations data model, that represents the MPRN, has an ESP assignment. Each ESP (Energy Service Provider) corresponds to a SEM Supplier Unit.

6.2.1 EARN ID/MPRN/SU Mapping

There is a process that can be run to verify the mappings between all non-participant generation points and corresponding supplier units.

This process will record messages to the process log whenever invalid associations are found. The following conditions are considered invalid and are logged:

- A single account (MPRN) is associated with more than one EARN ID / non-participant generation point. This can occur when an account has multiple meters (serial numbers) and they do not all indicate the same non-participant generation point (by way of their Schedule Group assignment).
- A single non-participant generation point (EARN ID) is associated with more than one Supplier Unit. This occurs when the generation point has more than one associated account (MPRNs) and the accounts do not all have the same ESP (Supplier Unit) assignment.

This process can be invoked from the **Aggregated Meter Data (59x)** or the **NI Aggregated Messages (5xx)** reports on the Market Messages screen. See sections 5.1 Aggregated Meter Data (59x) and 5.2 NI Aggregated Messages (5xx) for more information on this report.

6.3 Calculation Process

When net demand calculations are performed automatically from a background job, the process that is actually executed is a Calculation Process named **Aggregate TDIE to SEM SU**.

Running this process will generate entries in the Process Log with process names of **Calculation Process: Aggregate TDIE to SEM SU**.

This process must be *manually* run to compute the SEM net demand volumes under some circumstances:

- The Reactor background job is disabled.
- The Schedule Data table is not enabled for auditing or is not marked as "reactive".
- An error occurs during an automatic calculation run that requires user action. Once corrective action is taken, the calculations that were supposed to be done automatically must be initiated manually.

To run the process manually, perform the following steps:

1. Login to the application
2. Click the "SEM Operations" link in the home page tree
3. Choose **Run** > **Calculations** from the application main menu
4. On the Run Calculations tab, make sure the Calculation Process filter shows **Aggregate TDIE to SEM SU** selected.
5. Choose the Statement Type to calculate
    - An error will occur if you try to run these calculations for a statement type other than one of the *Internal* statement types (see section 4.3 Statement Types and the SEM Settlement Calendar for more information).
6. Check all Supplier Units in the grid for which you want to run net demand calculations.
    - To quickly select all rows, check the first row and then right-click and choose **Fill to End of Column**.
7. Set the toolbar dates to the range of days to be calculated.
8. Finally, in the **Run Now** box, click the **Run Selected Entities** button.

From the Calculations window, the View Intermediate Results tab can be used to examine the output of the calculation process. Assuming the process is successful, the net demand results will be stored in the appropriate schedules for the specified statement type.

Chapter 7: SEM Settlement Validation

The addition of IE T&D functionality to SEM shadow settlements provides additional validation capabilities for comparing the SEM supplier unit net demand value used in settlements against the values provided by the MRSO/ESBN and NIE.

To view the report, perform the following steps:

1. Login to the application
2. From the home page tree, select **SEM Operations** > **Settlement Comparison**
3. In the Reports drop-down, select **Settlement Validation**

Note: SEM settlement statements and PIRs must be imported and shadow settlement calculations must be executed *prior* to performing validation with this report. All the data shown in this report comes from these sources.

7.1 Report Types

There are two report types for settlement validation:

1. **Charge Amount:** This report type shows settlement statement amounts (in either GBP or Euro, depending on the registered currency of the selected participant).
    a) The main variable between the various sources of settlement data being compared/validated is NDLF for supplier units.
    b) The user selects a charge type to use as the basis for comparison to see how variances in NDLF between settlement data influences the calculated statement amounts.
    c) The user can compare the following sources of statement data:
        i. **Statement:** Sourced from the imported SMO statements. This "flavor" of statement data is also known as *External*.
        ii. **PIR:** Sourced from the shadow settlement results that use volumes from the imported SMO PIR files. This "flavor" of statement data is also known as *SMO*.
        iii. **IE T&D:** Sourced from shadow settlement results that use volumes from the imported aggregated demand data messages (from MRSO/ESBN and NIE).
        iv. **Internal:** Sourced from shadow settlement results that use internal volumes. With IE T&D functionality, the source of these internal volumes are load aggregation calculations.
        v. See section 4.3 Statement Types and the SEM Settlement Calendar for more details on the various statement types and sources of settlement data.
2. **Energy Volume:** This report type shows MWh volumes used in settlement calculations.
    a) As above, the main variable between the various sources of settlement data being compared/validated is NDLF for supplier units.
    b) To that end, the charge types used for the basis of comparison all feature NDLF as the charge volume.

c) The user can compare the following sources of statement data:

i. **Statement:** Sourced from the imported SMO PIR files. This source of volumetric data is the same for both *External* and *SMO* statements.

ii. **IE T&D:** Sourced from the imported aggregated demand data messages (from MRSO/ESBN and NIE).

iii. **Internal:** Sourced from internal volumes. With IE T&D functionality, the source of these internal volumes are load aggregation calculations.

iv. See section 4.3 Statement Types and the SEM Settlement Calendar for more details on the various statement types and sources of settlement data.

7.2 Report Filters

After selecting a report type, the following report filters must be selected:

- **Participant:** Choose the SEM participant for which you would like to view settlement validation results.
- **Statement Type:** Choose the statement for which you would like to view settlement validation results:
  - **Indicative:** Draws data from the Indicative statements.
  - **Initial:** Draws data from the Initial statements and from Initial invoices if available.
  - **Best Available:** Draws data from the most recent invoice. If no invoice is available, then a blend of statement types may be used (for example some Indicative and some Initial statements may exist in the system prior to importing the Initial invoice).
- **Component:** The user may select one of the three charge components for which NDLF is the charge volume: ENCEX, CCEX, and IMPCEX. There also exists an <All> option which will show the validation results across multiple SEM markets.
- **Tolerance:** The user can choose to filter the results so that only variances are shown.
  - Check the box labeled **Enable Tolerance**. Define the tolerance limit for variances into the subsequent text fields. You must define a limit for at least one field and can optionally define limits for more than one field.
  - If multiple tolerance values are entered, they must all apply for results to appear in the grid.
    - For example: entering 10 for the *IE T&D % Difference* and 20 for the *Internal % Difference* fields will only show results for invoices where the percent difference between the IE T&D and Statement values is greater than or equal to 10% **and** the percent difference between the Internal and Statement values is greater than or equal to 20%.
  - Percent difference is calculated as the percentage difference between the named statement data and the **Statement** (also known as External) source. The Statement source is the value used as the basis for percentage calculations.
  - When the Report Type is **Charge Amount**, there are three tolerances that can be defined:
    - PIR % Difference
    - IE T&D % Difference
    - Internal % Difference
  - When the Report Type is **Energy Volume**, the *PIR % Difference* tolerance is not available (since the Statement and PIR energy volumes both come from the same place: the SMO PIR files).

7.3 Report Contents

Once the report type and report filters have been entered, click the **Refresh** toolbar button or select **View** > **Refresh** from the window's main menu bar. The report features two grids. Selecting a row in the top grid will show corresponding detail data in the bottom grid.

7.3.1 Summary Grid

The top grid, labeled Summary, shows information for all invoice periods that matched the report filter criteria and the toolbar date range.

Note: The tolerances entered into the report filters apply to the Summary Grid. If the *Enable Tolerance* box is checked, the results will be filtered to only show variances.

The grid will show the following fields:

- **Invoice ID:** The ID from the imported SMO invoice. This field will be blank if no applicable invoice is available for this invoice period.
- **Invoice Period:** The invoice period for this row.
- **Statement Type:** This will match the statement type selected in the report filters unless you chose Best Available in the filter. In that case, it will show the statement type for the best available (most recently published) invoice for this period. If no invoice is available and the best available statements are heterogeneous (for example, some statement dates have only Indicative statements published, but older ones have Initial statements published) then *Various* will be shown.
- **Charge Component:** The component selected in the report filter. If <*All*> was selected then there may be results for multiple components.
- **Invoice Amount:** The total amount from the imported SMO invoice. This field will be blank if no applicable invoice is available for this invoice period.
  - Only shown when the report type is Charge Amount.
- **Statement Amount / Statement Volume:** The total amount or volume for the imported SMO statement.
- **PIR Amount, PIR Diff, PIR % Diff:** This set of columns shows the total amount from shadow settlement results for the SMO statement types. They also indicate the difference (computed as `PIR Amount – Statement Amount`) and corresponding percent difference.
  - Only shown when the report type is Charge Amount
- **IE T&D Amount / IE T&D Volume, IE T&D Diff, IE T&D % Diff:** This set of columns shows the total amount or volumes from shadow settlement results for the IE T&D statement types. They also indicate the difference (computed as `IE T&D Amount – Statement Amount`) and corresponding percent difference.
- **Internal Amount / Internal Volume, Internal Diff, Internal % Diff:** This set of columns shows the total amount or volumes from shadow settlement results for the *Internal* statement types. They also indicate the difference (computed as `Internal Amount – Statement Amount`) and corresponding percent difference.

7.3.2 Details Grid

The bottom grid, labeled Details, shows statement-level details for the invoice period selected in the top grid.

Note: The tolerances entered into the report filters apply to the Summary Grid, not the Details grid. The Summary grid may be filtered to show variances, but the Details grid will always show *all available* details for the selected invoice.

The grid will show mostly the same fields as the Summary grid, but at a statement level of granularity.

- **Date:** The statement date for this row.
- **Statement Type:** This will match the statement type indicated in selected row of the Summary grid unless that value indicates *Various*, in which case it will show the statement type of the best available statement imported for this date.
- **Statement Amount / Statement Volume:** The total amount or volume for the imported SMO statement.
- **PIR Amount, PIR Diff, PIR % Diff:** This set of columns shows the total amount from shadow settlement results for the SMO statement types. They also indicate the difference (computed as `PIR Amount – Statement Amount`) and corresponding percent difference.
  - Only shown when the report type is Charge Amount
- **IE T&D Amount / IE T&D Volume, IE T&D Diff, IE T&D % Diff:** This set of columns shows the total amount or volumes from shadow settlement results for the IE T&D statement types. They also indicate the difference (computed as `IE T&D Amount – Statement Amount`) and corresponding percent difference.
- **Internal Amount / Internal Volume, Internal Diff, Internal % Diff:** This set of columns shows the total amount or volumes from shadow settlement results for the Internal statement types. They also indicate the difference (computed as `Internal Amount – Statement Amount`) and corresponding percent difference.

To drill-in to even lower levels of detail, double-click a row in the Details grid or right-click and select *Details…*

When viewing the Charge Amount report type, the drill-down will show Charge Amount Details (see section 7.3.3 Charge Amount Details for more information).

When viewing the Energy Volume report type, the drill-down will show Energy Volume Details (see section 7.3.4 Energy Volume Details for more information).

7.3.3 Charge Amount Details

Like the main Settlement Validation report described above, the Charge Amount Details includes numerous report filters. Most will be set based on the row from which the user opened the details view.

- **Begin Date, End Date:** The date range over which to view details. This defaults to the single statement date from which the user opened the details view.
- **Interval:** Select either 30 Minute to view interval details or Day to view daily roll-ups of amounts.
- **Participant:** The SEM participant for which to view results. This defaults to the same participant as the Settlement Validation report.
- **Component:** The charge type used for displaying and comparing charge amounts. This defaults to the component that was shown in the row from which the user opened this details view.
- **Supplier Unit:** This allows you to narrow the results down to a single supplier unit. It defaults to <*All*>.

- **Tolerance:** These fields allow you to configure the report to only show variances that exceed certain tolerances. The fields are the same as those on the Settlement Validation report for the Charge Amount report type.

When the results grid is populate, the following data is shown:

- **Date/Time:** The day or 30 minute interval for this row.
- **Supplier Unit**. The unit for which data is shown on this row.
- **Statement Type:** The statement type for which data is shown.
- **Charge Component:** The component whose charge amounts are shown.
- **Statement Amount:** The total amount imported from SMO statements for this date/time, supplier unit, statement, and charge type.
- **PIR Amount, PIR Diff, PIR % Diff:** This set of columns shows the corresponding total amount from shadow settlement results for the SMO statement types. They also indicate the difference (computed as `PIR Amount – Statement Amount`) and corresponding percent difference.

- **IE T&D Amount, IE T&D Diff, IE T&D % Diff:** This set of columns shows the corresponding total amount from shadow settlement results for the IE T&D statement types. They also indicate the difference (computed as `IE T&D Amount – Statement Amount`) and corresponding percent difference.
- **Internal Amount, Internal Diff, Internal % Diff:** This set of columns shows the corresponding total amount from shadow settlement results for the Internal statement types. They also indicate the difference (computed as `Internal Amount – Statement Amount`) and corresponding percent difference.
- **Dispute:** This checkbox indicates if a dispute has been marked for this row. This checkbox is also editable – you can check or uncheck this box and click the **Save** toolbar button (or **File** > **Save** from window's main menu bar) to initiate or remove a dispute.
  - Disputes can also be initiated from the *Charge Details* view, accessible from the **Settlement & Billing** > **Comparison** tab.
  - Disputes can further be queried and updated/managed from the **Settlement & Billing** > **Dispute Status** tab.

7.3.4 Energy Volume Details

Like the main Settlement Validation report described above, the Energy Volume Details includes numerous report filters. Most will be set based on the row from which the user opened the details view.

- **Begin Date, End Date:** The date range over which to view details. This defaults to the single statement date from which the user opened the details view.
- **Interval:** Select either 30 Minute to view interval details or Day to view daily roll-ups of amounts.
- **Participant:** The SEM participant for which to view results. This defaults to the same participant as the Settlement Validation report.
- **Supplier Unit:** This allows you to narrow the results down to a single supplier unit. It defaults to *<All>*.
- **Tolerance:** These fields allow you to configure the report to only show variances that exceed certain tolerances.
  - The top checkbox, labeled *Enable Tolerance (**Energy Vols**)*, and the two subsequent fields are the same as those on the Settlement Validation report for the Energy Volume report type. They are used to filter results in the top data grid.

- The bottom checkbox, labeled *Enable Tolerance (**IE T&D Vols**)*, and the two subsequent fields filter results in the top data grid.
  - **Interval Volume % Diff:** This allows a tolerance to be set so that only variances in interval volumes (those imported in 595 XML messages compared to the corresponding load aggregation results) are shown.
  - **Non-Interval Volume % Diff:** This allows a tolerance to be set so that only variances in non-interval volumes (those imported in 591 XML messages compared to the corresponding load aggregation results) are shown.

Two results grids are shown. The top grid, labeled **Energy Volume**, shows the energy volume details from applicable statement data. This grid has the following fields:

- **Date/Time:** The day or 30 minute interval for this row.
- **Supplier Unit:** The unit for which data is shown on this row.
- **Statement Type:** The statement type for which data is shown.
- **Statement/PIR Volume:** The total volume imported from SMO PIR files for this date/time, supplier unit, statement, and charge type.
- **IE T&D Agg. (591+595-598):** This column shows the calculated net demand for this supplier unit based on imported aggregated demand data.
  - The volume is calculated as per the formula in the label: non-interval metered demand volumes (from 591 XML messages) plus interval metered demand volumes (from 595 XML messages) minus non-participant generation (from 598 XML messages for EARN IDs associated with this supplier unit).
  - The calculations are the same for supplier units in Northern Ireland except the values come from the CSV file published by NIE, not from XML messages.
- **IE T&D Volume, IE T&D Diff, IE T&D % Diff:** This set of columns shows the corresponding total volume from shadow settlement results for the IE T&D statement types. They also indicate the difference (computed as `IE T&D Amount – Statement Amount`) and corresponding percent difference.
  - This volume will come from the 596 XML messages published by MRSO/ESBN for supplier units in the Republic of Ireland. For units in Northern Ireland, this value is the same as the previous column.
- **Internal Volume, Internal Diff, Internal % Diff:** This set of columns shows the corresponding total volume from shadow settlement results for the Internal statement types. They also indicate the difference (computed as `Internal Amount – Statement Amount`) and corresponding percent difference.
- **Dispute:** This checkbox indicates if a dispute has been marked for this row. This checkbox is also editable – you can check or uncheck this box and click the Save toolbar button (or **File** > **Save** from window's main menu bar) to initiate or remove a dispute.
  - Disputes can also be initiated from the *Charge Details* view, accessible from the **Settlement & Billing** > **Comparison** tab.
  - Disputes can further be queried and updated/managed from the **Settlement & Billing** > **Dispute Status** tab.
- **Sum of 598 Volume:** This represents the total non-participant generation volumes for this supplier unit as imported from aggregated demand data published by MRSO/ESBN or NIE.
  - See section 6.2.1 EARN ID/MPRN/SU Mapping for more information on how EARN IDs in 598 messages are mapped to supplier units.

The bottom grid, labeled **IE T&D Volume**, shows the corresponding energy volumes from aggregated meter data messages and from corresponding load aggregation results. This grid has the following fields:

- **Date/Time:** The day or 30 minute interval for this row.
- **Supplier Unit:** The unit for which data is shown on this row.
- **Statement Type:** The statement type for which data is shown
- **Interval Meters 595 Volume:** This column shows the total interval metered volumes from 595 XML messages (or corresponding data in CSV messages published by NIE) for the current date/time, supplier unit, and statement type.
- **Interval Meters 341 Volume:** This column shows the total interval metered volumes from load aggregation results, which represent the aggregated *import* volumes from 341 XML messages for the current date/time, supplier unit, and statement type.
- **Interval Meters Diff, Interval Meters % Diff:** These columns indicate the difference (computed as `Interval Meters 341 Volume – Interval Meters 595 Volume`) and corresponding percent difference.
- **Interval Meters Under Review:** This column shows checkboxes where you can mark variances as needing review. The value of this checkbox/flag is also shown in other reports for examining 595 aggregated demand data (see sections 5.1 Aggregated Meter Data (59x) and 5.2 NI Aggregated Messages (5xx) for more details).
- **Non-Interval Meters 591 Volume:** This column shows the total interval metered volumes from 591 XML messages (or corresponding data in CSV messages published by NIE) for the current date/time, supplier unit, and statement type.
- **Non-Interval Meters 300 Volume:** This column shows the total non-interval metered volumes from load aggregation results, which represent the aggregated volumes based on profile definitions and usage factors from 300, 300S, 306, 307, 310, 320, and 332 XML messages for the current date/time, supplier unit, and statement type.
- **Non-Interval Meters Diff, Interval Meters % Diff:** These columns indicate the difference (computed as `Non-Interval Meters 300 Volume – Non-Interval Meters 591 Volume`) and corresponding percent difference.
- **Non-Interval Meters Under Review:** This column shows checkboxes where you can mark variances as needing review. The value of this checkbox/flag is also shown in other reports for examining 591 aggregated demand data (see sections 5.1 Aggregated Meter Data (59x) and 5.2 NI Aggregated Messages (5xx) for more details).
- **Interval Meters 598 Volume:** This column shows the total non-participant generation volumes from 598 XML messages (or corresponding data in CSV messages published by NIE) for the current date/time, supplier unit, and statement type.
  - See section 6.2.1 EARN ID/MPRN/SU Mapping for more information on how EARN IDs in 598 messages are mapped to supplier units.
- **Interval Meters 342 Volume:** This column shows the total interval metered volumes from load aggregation results, which represent the aggregated *export* volumes from 342 XML messages (341 XML messages in NI) for the current date/time, supplier unit, and statement type.
- Interval Meters Diff, Interval Meters % Diff. These columns indicate the difference (computed as `Interval Meters 342 Volume – Interval Meters 598 Volume`) and corresponding percent difference.

To see "342" vs. "598" comparisons at a lower level of granularity, by EARN ID, double-click a row in the IE T&D Volumes grid or right-click and select **Non-Participant Generation Details…** (see section 7.3.5 below for more information).

7.3.5 Non-Participant Generation Details

This view is a drill-down view from Energy Volume Details, and shows total non-participant generation volumes by non-participant generation point. It compares the total volumes from 598 XML messages (or from analogous records in CSV files for NI) against load aggregation results which aggregate export volumes from 341 (NI) and 342 (ROI) XML messages.

The data shown are for the statement type and supplier unit from the Energy Volume Details view -- from the selected row when this drill-down screen was opened. There is a date range selection that defaults to the same date range as the Energy Volume Details view.

The data grid for this view shows the following fields:

- **Date:** The date and time for this row.
- **EARN ID:** This will be the EARN ID for ROI non-participant generation or the supplier unit for NI (where non-participant generation is reported summarized by supplier unit).
- **598 Volume:** The volume from the 598 XML message (ROI) or the equivalent records from CSV file (NI).
- **342 Volume:** The total corresponding volume from load aggregation results. The load aggregation process will aggregate export volumes from 341/342 XML messages and apply loss factors.
- **Diff, % Diff:** These columns indicate the difference (computed as `342 Volume – 598 Volume`) and corresponding percent difference.

The data grid should show one row per 15 minute interval per EARN ID for ROI participants. It will show one row per 30 minute interval per supplier unit for NI.

Chapter 8: Importing TUoS/DUoS Invoice Backing Sheets

The IE T&D functionality of Market Operations includes support for loading invoice backing sheet CSV files (Comma-Separated Values) in each of the following three formats:

- ROI DUoS (DSO/ESBN)
- ROI TUoS (EirGrid) *
- NI UoS (NIE and SONI)

A facility is provided in the user interface for loading these files into the application and viewing the contents of these files online also through the user interface.

Once an invoice backing sheet file has been imported, users can perform static data validation and shadow settlements on it (see TUoS/ DUoS Invoices for more details).

* ROI TUoS backing sheets are provided in an Excel workbook format. See Appendix C: Converting ROI TUoS Spreadsheets to CSV for details on how to save these workbooks into a CSV format that can be imported into Market Operations.

8.1 Importing Files Using Data Exchange

Backing sheet files are loaded into the application using the Data Exchange feature:

- Login to the application
- From the home page menu, select the following option: **SEM Operations** > **IE T&D**
- From the application main menu, select **Run** > **Data Exchange**.

The Data Exchange dialog will have numerous options in the Exchange Type drop-down that include both SEM and IE T&D data exchange functions. The following option is used to import backing sheet files:

- **IE T&D: Import Backing Sheet**

  With this option you can import backing sheets, one at a time. You **must** select one of the following file formats from the list on the right prior to importing the file:

  - **DuoS** – The ROI DUoS backing sheet format provided by DSO/ESBN.
  - **TuoS** – The ROI TUoS backing sheet format in CSV format, converted from the Excel workbook provided by EirGrid.
  - **UoS** – The NI UoS backing sheet formats provided by NIE for NI DUoS invoices and by SONI for NI TUoS invoices.

  When you click the "Run" button, the selected file will be imported. Upon completion, a message will be shown indicating whether the file import was succ–ul or not.

8.2 Viewing Imported Backing Sheets

On import, the backing sheets are imported into tables in the database that mirror the structure of the original CSV files. These views provide access to those raw structures and allow users to see the contents of the CSV files in an intuitive user interface:

- Login to the application
- From the home page tree, select **SEM Operations** > **IE T&D**
- You will see seven sub-tabs on this screen, three of which are described below in the following three sections. The name of each section below corresponds to the tab it describes.

8.2.1 DUoS

On this tab, you can view backing sheets for ROI DUoS invoices published by DSO/ESBN.

The top grid will show a listing of imported invoices that match the following criteria:

- **Invoice Date:** Invoices are shown in the top grid when their invoice date (date of issue – from the Create Timestamp field on the file) falls within the date range selected on the toolbar.
- **Recipient:** A drop-down on the left allows the user to select an invoice recipient. Invoices shown in the grid will match the selected recipient ID.

The top grid shows the following columns to summarize each invoice in the list:

- **Invoice Number:** The invoice number indicated in the file.
- **Sender ID:** The sender ID indicated in the file (should be DSO).
- **Recipient ID:** The recipient ID indicated in the file (should match selected recipient ID in filter drop-down).
- **Create Timestamp:** The creation timestamp indicated in the file.
- **Control Total:** The total charges indicated in the header of the invoice file.
- **Charges Imported:** The actual charges imported – calculated as the sum of the Net Amount column for each detail record in the file. If this varies from the **Control Total** column then the invoice file may be incomplete or damaged.
- **Gross Amount:** The actual gross charges imported (includes VAT) – calculated as the sum of the Gross Amount column for each detail record in the file.
- **Total Records:** The total number of records indicated by the footer of the invoice file.
- **Records Imported:** The actual number of records imported. If this varies from the **Total Records** field then the invoice file may be incomplete or damaged.
- **Import Timestamp:** The date and time when the file was last imported into the system.
- **File Name:** The path and name of the file used to import this backing sheet.

The bottom grid of the DUoS view can show raw details from the invoice backing sheet or a summary of charges by distribution group.

Regardless of the type of details shown, right-clicking in either the top or bottom grid provides report options for additional information for the selected backing sheet (see section 12.1 Backing Sheet Reports).

8.2.1.1 MPRN Details

If the **MPRN Details** option is selected from the **Details** drop-down on the left, the bottom grid of the report will show MPRN-level details for the backing sheet currently selected in the top grid.

You can specify a search string to only show records for matching MPRNs. If the search string is blank or is set to the wildcard "%" then all rows in the invoice will be shown.

The bottom grid shows the following columns from the backing sheet file:

- **MPRN:** The MPRN number for a row in the file.
- **DUoS:** The DUoS Group of this MPRN.
- **Billing Begin Date, Billing End Date:** These columns indicate the date range for the charges for a given row in the file.
- **Invoice Item Number:** The unique item number for this row as specified in the file.
- **Invoice Type:** A code that indicates the type of invoice record for the current row.
- **Adjusted Reference:** For cancelled records (invoice type of 2S, 2C, or 2D), this refers to the Invoice Item Number of the record being cancelled.
- **Day TOU kWh:** The energy consumption for this MPRN and bill period for the day timeslot. This field will be blank if the MPRN does not have Day/Night metering.
- **Day TOU Charges:** The total charges for this MPRN and bill period for the day energy charges. This field will be blank if the MPRN does not have Day/Night metering.
- **Night TOU kWh:** The energy consumption for this MPRN and bill period for the night timeslot. This field will be blank if the MPRN does not have Day/Night metering.
- **Night TOU Charges:** The total charges for this MPRN and bill period for the night energy charges. This field will be blank if the MPRN does not have Day/Night metering.
- **24 Hr kWh:** The energy consumption for this MPRN and bill period. This field will be blank if the MPRN has Day/Night metering instead of around-the-clock metering.
- **24 Hr Charges:** The total charges for this MPRN and bill period for 24-hour energy charges. This field will be blank if the MPRN has Day/Night metering instead of around-the-clock metering.
- **Standing:** The total standing charges for this MPRN and bill period.
- **Capacity:** The total capacity charges for this MPRN and bill period.
- **Max Import Capacity:** The MPRN's MIC value (in KVA) for this bill period.
- **Max Kva:** The peak KVA for this MPRN during this bill period.
- **MIC Surcharge:** The total MIC surcharges for this MPRN and bill period.
- **Reactive kVArh:** The total reactive energy for this MPRN and bill period.
- **Power Factor Surcharge:** The total low power factor surcharges for this MPRN and bill period.
- **Net Amount:** The total charges for this MPRN and bill period, excluding VAT.
- **Gross Amount:** The total charges for this MPRN and bill period *including* VAT.

8.2.1.2 Group Summary

If the **Group Summary** option is selected from the **Details** drop-down on the left, the bottom grid of the report will summarize the invoice backing sheet records by DUoS Group.

The bottom grid shows the following columns:

- **DUoS Group:** There will be one row per DUoS group present in the file.
- **Total Records:** The number of records imported for this DUoS group.
- **Day TOU kWh:** The total energy consumption for all MPRNs in this DUoS Group for the day timeslot.
- **Day TOU Charges:** The total charges for all MPRNs in this DUoS Group for the day energy charges.
- **Night TOU kWh:** The total energy consumption for all MPRNs in this DUoS Group for the night timeslot.
- **Night TOU Charges:** The total charges for all MPRNs in this DUoS Group for the night energy charges.
- **24 Hr kWh:** The total energy consumption for all MPRNs in this DUoS Group that have around-the-clock metering (vs. Day/Night metering).
- **24 Hr Charges:** The total charges for all MPRNs in this DUoS Group for 24-hour energy charges.
- **Reactive kVArh:** The total reactive energy for all MPRNs in this DUoS Group.
- **Standing:** The total standing charges for all MPRNs in this DUoS Group.
- **Capacity:** The total capacity charges for all MPRNs in this DUoS Group.
- **MIC Surcharge:** The total MIC surcharges for all MPRN in this DUoS Group.
- **LPF:** The total low power factor surcharges for all MPRNs in this DUoS Group.
- **Total New Charges:** The total number of charges for this DUoS Group that are new – indicated by an invoice type of 1S.
- **Credits:** The total number of credits/cancellations for this DUoS Group – indicated by an invoice type of 2S, 2C, or 2D.
- **Debits:** The total number of debits/rebills for this DUoS Group – indicated by an invoice type of 3S, 3C, or 3D.
- **Total Charges:** The total number of charges (new, credit, and debit/rebill) for this DUoS Group. This should match the **Total Records** column.

8.2.2 TUoS

On this tab, you can view backing sheets for ROI TUoS invoices published by EirGrid.

The top grid will show a listing of imported invoices that match the following criteria:

- **Invoice Date:** Invoices are shown in the top grid when their invoice date (date of issue – from the Invoice Date field in the file) falls within the date range selected on the toolbar.

The top grid shows the following columns (from the left-most fields in the spreadsheet) to summarize each invoice in the list:

- Invoice Number
- Invoice Name
- Invoice Start Date
- Invoice End Date
- Invoice Date
- Invoice Due Date
- Customer ID
- Customer Name

Additionally, the following fields are shown that summarize the contents of the backing sheet:

- **Charges Imported:** The actual charges imported – calculated as the sum of the *Inv Det Value* column for each detail record whose **Inv Det Type** field is "CHARGES FOR ACCOUNT IN CHARGING INTERVAL".
- **VAT:** The actual VAT imported – calculated as the sum of the *VAT Charge* column for each detail record whose *Inv Det Type* field is "CHARGES FOR ACCOUNT IN CHARGING INTERVAL".
- **Gross Amount:** The actual gross charges imported – calculated as the sum of the **Charges Imported** and **VAT** columns.
- *** QH MPRN Count:** The total number of distinct QH (interval-metered) MPRNs referenced in the invoice file.
- *** Supplier Unit Count:** The total number of distinct supplier units referenced in the invoice file.
- **Records Imported:** The actual number of records/rows imported.
- **Import Timestamp:** The date and time when the file was last imported into the system.
- **File Name:** The path and name of the file used to import this backing sheet.

* In order for the import logic to distinguish between rows for QH MPRNs and rows for supplier units (aggregated NQH MPRNs), additional information must be provided (see section 8.2.2.3 Wholesale/ Supplier Unit Records).

The bottom grid of the TUoS view can show raw details from the invoice backing sheet or a summary of charges by tariff code.

Regardless of the type of details shown, right-clicking in either the top or bottom grid provides report options for additional information for the selected backing sheet (see section 12.1 Backing Sheet Reports).

8.2.2.1 Account Details

If the **Account Details** option is selected from the **Details** drop-down on the left, the bottom grid of the report will show all detailed records from the backing sheet file currently selected in the top grid.

You can specify a search string to only show records for matching Account Names or Account IDs. If the search string is blank or is set to the wildcard "%" then all rows in the invoice will be shown.

The bottom grid shows the following columns from the backing sheet file:

- Account ID
- Account Category
- Account Type
- Account Code
- Account Name
- VMeter ID
- VMeter Category
- VMeter Type
- VMeter Code
- VMeter Name *(also known as MPRN)*
- Invoice Category
- Bill Name
- Bill Contact
- Bill Address
- Bill Address 2
- Bill City
- Bill Region
- Bill Country
- Bill Postal Code
- *** MPRN**
- *** Supplier Unit**
- Inv Det Start Date
- Inv Det End Date
- Inv Det Category
- Inv Det Type
- Inv Det Code
- Inv Det Category2
- Inv Det Seq
- Inv Det Name
- Inv Det Value
- Inv Det UOM
- Multi-CIP Flag
- VAT Charge
- Inv Det Value Charge
- Inv Det Value Charge No VAT
- Inv Det Type Sort
- Eir Rpt Inv Det Id
- Bill Date
- CIP Date

- Inv Status Draft
- Inv Number Released
- Inv Date Released
- Inv Det Notes
- Inv Det Note Sort

* In order for the import logic to distinguish between rows for QH MPRNs and rows for supplier units (aggregated NQH MPRNs), additional information must be provided (see section 8.2.2.3 Wholesale/ Supplier Unit Records).

8.2.2.2 Tariff Summary

If the **Tariff Summary** option is selected from the **Details** drop-down on the left, the bottom grid of the report will summarize the invoice backing sheet records by Tariff Code.

The bottom grid shows the following columns:

- **Tariff:** There will be one row per tariff code present in the file.
- **Total Charges:** The total charges for this tariff code
- **Total Customers:** The total number of distinct Account and VMeter IDs in the file for this tariff code.
- **Energy Totals:** The total energy volumes for this Tariff code. This is a *group* of columns with sub-totals by volume type.
  - The volume types represent the various determinant codes for determinants whose type is "CHARGING PARAMETERS" and whose unit of measure is MWh.
- **Charge Totals:** The total charges for this Tariff code. This is a *group* of columns with sub-totals by charge type.
  - The charge types represent the various determinant codes for determinants whose type is "CHARGES FOR ACCOUNT IN CHARGING INTERVAL".

8.2.2.3 Wholesale/ Supplier Unit Records

In order for the import logic to distinguish between rows that represent QH MPRNs and those that represent NQH MPRNs aggregated by supplier unit, additional information must be entered into the system.

- Login to the application
- From the home page menu, select the following option:
  SEM Operations > **IE T&D** > **Financial Settlements**
- Then select the following report from the upper-left drop-down of report names:
  TUoS Supplier Unit Mapping

From this screen, you will map Account IDs and VMeter Names found in the TUoS spreadsheet to SEM supplier units. Most entries in the spreadsheet represent QH MPRNs (and VMeter Name will be a 10-digit MPRN). Entries that represent aggregated NQH MPRNs will have particular Account Codes and VMeter Names.

These mappings must be entered into Market Operations before the invoice can be successfully validated. Otherwise, the records that represent these aggregated NQH MPRNs will fail static data validation and will not be shadow settled.

To enter a mapping, right-click in the grid area of the report and select **Insert Row**. Then select the Account Code and VMeter Name in this new row that represent a supplier unit. These fields will show drop-down lists that let you select from the values that have been imported from TUoS spreadsheets. The VMeter Name drop-down will exclude entries from the spreadsheets that are MPRNs (10-digit integers). Finally, you must choose the SEM supplier unit to which the specified Account Code and VMeter Name correspond. This final selection is also a drop-down showing SEM supplier units in the system, so you must have first downloaded the SEM MP report named "*Active Units and Participants*".

8.2.3 UoS

On this tab, you can view backing sheets for NI DUoS (published by NIE) and TUoS (published by SONI).

The top grid will show a listing of imported invoices that match the following criteria:

- **Invoice Date:** Invoices are shown in the top grid when their invoice date (date of issue – from the Create Timestamp field in the file) falls within the date range selected on the toolbar.
- **Recipient:** A drop-down on the left allows the user to select an invoice recipient. Invoices shown in the grid will match the selected recipient ID.

The top grid shows the following columns to summarize each invoice in the list:

- **Invoice Number:** The invoice number indicated in the file.
- **Sender ID:** The sender ID indicated in the file (should be NIE T&D or SONI).
- **Recipient ID:** The recipient ID indicated in the file (should match selected recipient ID in filter drop-down).
- **Create Timestamp:** The creation timestamp indicated in the file.
- **Invoice Due Date:** Due date indicated in the file.
- **Total Consumption:** The total consumption charges indicated in the header of the invoice file.
- **Total CSC:** The total capacity surcharges indicated in the header of the invoice file.
- **Total Reactive:** The total reactive charges indicated in the header of the invoice file.
- **Total Standing Charge:** The total standing charges indicated in the header of the invoice file.
- **Total Transmission Rebate:** The total transmission rebate credits indicated in the header of the invoice file.
- **Total Ad-Hoc:** The total of ad-hoc charges indicated in the header of the invoice file.
- **Total Canceled:** The total of canceled charges indicated in the header of the invoice file.
- **Total Consumption kWh:** The total energy consumption volumes billed indicated in the header of the invoice file.
- **Total Detail Lines:** The total number of detail records indicated by the footer of the invoice file.
- **Charges Imported:** The actual charges imported – calculated as the sum of the Charge column for each detail record in the file, excluding VAT records. If this varies from the sum of the other total columns (indicated in the file header) then the invoice file may be incomplete or damaged.
- **Total Gross Charge:** The actual gross charges imported (includes VAT) – calculated as the sum of the Charge column for every detail record in the file.
- **Total Customers:** The count of distinct MPRNs billed in the invoice file.
- **Records Imported:** The actual number of records imported. If this varies from the Total Detail Lines field then the invoice file may be incomplete or damaged.
- **Import Timestamp:** The date and time when the file was last imported into the system.
- **File Name:** The path and name of the file used to import this backing sheet.

The bottom grid of the UoS view can show raw details from the invoice backing sheet or a summary of charges by tariff code.

Regardless of the type of details shown, right-clicking in either the top or bottom grid provides report options for additional information for the selected backing sheet (see section 12.1 Backing Sheet Reports).

8.2.3.1 MPRN Details

If the **MPRN Details** option is selected from the **Details** drop-down on the left, the bottom grid of the report will show MPRN-level details for the backing sheet currently selected in the top grid.

You can specify a search string to only show records for matching MPRNs. If the search string is blank or is set to the wildcard '%' then all rows in the invoice will be shown.

The bottom grid shows the following columns from the backing sheet file:

- **Record Type:** The charge type for a row in the file.
- **MPRN:** The MPRN number for this row in the file.
- **Meter ID Serial Number:** The optional meter serial number for this row in the file.
- **Start Date, End Date:** These columns indicate the date range for the charges for a given row in the file.
- **Unit of Measurement:** The unit of measure for charge volumes for this row in the file. Optional (will be blank for VAT and standing charges).
- **Timeslot:** Optional timeslot code that represents the TOU period for this row in the file (for time of use metering).
- **Start Read:** The starting/prior meter read value for this row in the file (applies to NHH meters only).
- **Start Read Type:** Optional read status associated with the Start Read value.
- **End Read:** The ending/current meter read value for this row in the file (applies to NHH meters only).
- **End Read Type:** Optional read status associated with the End Read value.
- **Total Units:** The charge volume for this row in the file.
- **Estimated Units:** Portion of charge volume that was estimated.
- **UoS Tariff:** The tariff code for this MPRN.
- **Rate:** The charge rate for this row in the file.
- **Charge:** The charge amount for this row in the file.
- **Last Actual Read Value:** The previous meter read value for this row in the file (applies to NHH meters only). Can vary from **Start Read** if estimated reads were used in charge calculations.
- **Last Actual Read Date:** The date of the previous meter read.

8.2.3.2 Tariff Summary

If the **Tariff Summary** option is selected from the **Details** drop-down on the left, the bottom grid of the report will summarize the invoice backing sheet records by Tariff Code.

The bottom grid shows the following columns:

- **Tariff:** There will be one row per tariff code present in the file.
- **Total Consumption KWH:** The total of all KWH charge volumes for this tariff code.
- **Total Charges:** The total of all charge amounts for this tariff code.
- **Total Customers:** The total count of distinct MPRNs for this tariff code.
- **Energy Totals:** The total energy volumes for this tariff code. This is a group of columns with sub-totals by timeslot code.
- **Charge Totals:** The total charges for this tariff code. This is a group of columns with sub-totals by record type/charge type.

Chapter 9: TUoS/DUoS Invoices

Once a TUoS or DUoS invoice backing sheet has been imported, the system can perform validation of the invoice against static data and perform shadow settlement calculations.

The shadow settlement charge calculations are implemented using the *Retail Settlement/Billing Engine* in Retail Operations. These charge components can be viewed and maintained via the Entity Manager or the Products and Rates views in the system. Details on the configuration of charge components and the *Retail Settlement/Billing Engine* are beyond the scope of this document. Please refer to the application's online help system for more information.

To execute shadow settlement calculations for an imported invoice, perform the following steps:

- Login to the application
- From the home page menu, select the following option: **SEM Operations** > **IE T&D** > **Financial Settlements**
- Then select the following report from the upper-left drop-down of report names: **Run TUoS/DUoS Financial Settlements**

You can refine the list of invoices that are shown in the data grid by filtering them on the following criteria:

- **Date Range:** Select a range of dates in the toolbar. Only invoices issued (based on create timestamp or invoice date fields of backing sheet files) during this date range are shown.
- **Sender:** Choose the sender of the invoice from a drop-down list. You can select <All> to show all invoices unfiltered by sender.
  - **DSO:** The sender of ROI DUoS invoices
  - **EirGrid:** The sender of ROI TUoS invoices
  - **NIE T&D:** The sender of NI DuoS invoices
  - **SONI:** The sender of NI TUoS invoices
- **Recipient:** Choose the recipient of the invoice from a drop-down list. You can select <All> to show all invoices unfiltered by recipient.

Each row in the data grid represents an invoice that has been imported that matches the selected criteria. This view includes the following information:

- **Run?** This checkbox column should be checked to include this invoice when running account validation or shadow settlements.
- **Invoice Date:** This column indicates the date the invoice was issued (based on the create timestamp or invoice date field from the corresponding backing sheet).
- **Sender:** The sender of the invoice.
- **Recipient:** The recipient of the invoice.
- **Invoice Number:** The invoice number.
- **Last Run Date:** The date and time on which this invoice was last included in running account validation or shadow settlements. If the charge total columns to the right (see below) are blank, then this invoice was included in account validation, not in shadow settlements. If this column is blank, it has never been included in a run.
- **Last Run Status:** The process status for the last time the invoice was included in running account validation or shadow settlements. This will be blank if the invoice has never been included in a run.

- **Last Run Statement Type:** The statement type selected when shadow settlements were last executed for this invoice.
  - The statement type field is pertinent to ROI TUoS shadow settlements and indicates the source of schedule data used for aggregated NQH volumes.
- **Total External Charges:** The total charges in this backing sheet, *excluding* VAT.
- **Total External VAT:** The total VAT in this backing sheet.
- **Total External Amount:** The total gross charges in this backing sheet, including VAT.
- **Total Internal Charges:** The total charges calculated for this backing sheet during shadow settlements, excluding VAT.
- **Total Internal VAT:** The total VAT calculated for this backing sheet during shadow settlements.
- **Total Internal Amount:** The total gross charges calculated for this backing sheet during shadow settlements, including VAT.

For backing sheets that have been shadow settled, you can examine detailed settlement results and comparisons by right-clicking on the row and selecting the option named **Settlement Results**. See Shadow Settlement Results.

9.1 Running Shadow Settlements

To calculate (or re-calculate) shadow settlements for an invoice backing sheet, check the box in the **Run** column for that invoice, select a Statement Type from the drop-down on the left (in the box labeled *Run*), and click the button labeled *Run Financial Settlements*. You can instead click the button labeled *Run Account Validations* to perform validation on the invoice but not perform shadow settlement calculations (the first two of the three steps listed below).

To calculate settlements for multiple invoices, check the boxes for multiple invoices.

Running shadow settlements will result in process entries in the Process Log. For each execution, there will be a process named **IE T&D Financial Settlements**. This "master" process entry will include information on the status of each invoice executed. There will *also* be one process for *each* invoice included in the calculations. These additional processes will have more detail and log events that occurred during processing of an individual invoice. These processes will be named **Single IE T&D Financial Settlement**.

Similarly, if just running account validations, there will be a process named **IE T&D Invoice Validations** and there will be one or more corresponding processes (one for each selected invoice) named **Single IE T&D Invoice Validation**.

The Statement Type drop-down indicates the source of data for aggregated NQH volumes for ROI TUoS shadow settlements. Other volumes will use the meter data imported via 300-series XML messages (300, 320, and 332 message type codes for NQH/NHH meters; 341 and 342 message type codes for QH/HH meters).

The shadow settlement process *includes* performing validation on the invoice. There are three main steps in the shadow settlement process:

1. The first step in shadow settlements is to query the backing sheet data into a "canonical" invoice representation. This canonical structure can then be processed in the same fashion for all three invoice formats.
2. The second step is to perform the static data validation on the resulting canonical invoice data.
3. Finally, shadow settlement calculations are performed for all backing sheet records that are sufficiently valid to process.

- A record is not sufficiently valid to process, for example, if it references an MPRN that is missing from the static data. In this case, no internal information or meter data exists for that MPRN, so shadow settlement calculations cannot be done.

The following three sections include greater detail on these three steps.

9.2 Canonical Invoice Format

The first step in shadow settlement is to transform backing sheet data into a canonical invoice format that will feed the subsequent steps.

The "canonical" format includes a Sender, a Recipient, an Invoice Date, an Invoice Number and a set of records with the following fields:

- **MPRN**
- **MIC:** (Optional) MIC for this MPRN as indicated in backing sheet (not present in UoS invoice files).
- **Meter Serial Number:** (Optional) only used for UoS invoices.
- **Supplier Unit:** This value is used in place of the above two fields in determining a source of volumes for the invoice record. This is used for shadow settlement of records in ROI TUoS invoices that represent aggregated NQH volumes.
- **Begin Date, End Date:** The date range for the record (generally driven by meter read dates for NQH meters and by calendar month for QH meters).
- **Tariff Code:** The DUoS Group or Tariff Code for a record.
- **Charge Type:** The name or identifier of a charge component.
- **Charge State:** A flag used to distinguish between normal charges, cancellations, and adjustments. See section 9.2.2 Charge States for details on how the application determines this value.
- **Timeslot Code:** (Optional) used for charges where results are reported by time of use period.
- **External Quantity:** The charge quantity for this charge.
- **External Rate:** The charge rate for this charge.
- **External Amount:** The resulting charge amount.

The UoS backing sheet file format most closely resembles this layout and requires the least amount of transformation.

The DUoS backing sheet file format currently has all charges in a single row and does not include charge rates in the file. So, during transformation, a single row in the file is transformed into multiple records in the above format. Where the rates are unavailable, they are blank (so, when examining detailed results for DUoS invoices, rates will be blank).

The TUoS backing sheet file format currently has all determinants on a different row. So, during transformation, the data from applicable parameters, rates, and charges for account records must be combined into a single record. The process begins by enumerating the charge amounts (rows where the **Inv Det Type** field is "CHARGES FOR ACOUNT IN CHARGING INTERVAL"). It must then locate an applicable determinant that represent the charge quantity and rate for each charge type. This step – finding applicable determinant records for charge quantities and rates – requires user input to configure this look-up. See the next section for details.

9.2.1 TUoS Determinant Codes

In order for the application to transform an ROI TUoS backing sheet into the canonical format described above, configuration is required to associate charge amount determinants with the applicable charge quantity and charge rate determinants.

- Login to the application
- From the home page menu, select the following option: **SEM Operations** > **IE T&D** > **Financial Settlements**
- Then select the following report from the upper-left drop-down of report names: **TUoS Determinant Code Mapping**

The grid in this screen will list all charges observed in ROI TUoS backing sheets imported. It then allows selection of the rate and quantity determinants that should be used as the charge rate and charge quantity for the given charge type. The columns shown in the grid follow:

- **Charge Name:** The name of the charge type. This comes from the determinant code for items in the TUoS files where the **Inv Det Type** field is "CHARGES FOR ACCOUNT IN CHARGING INTERVAL".
- **Rate Name:** A drop-down from which you must select the determinant code that corresponds to the charge rate for this charge. The list is populated from items in the TUoS files where the **Inv Det Type** field is "RATES".
- **Quantity Name:** A drop-down from which you must select the determinant code that corresponds to the charge quantity for this charge. The list is populated from items in the TUoS files where the **Inv Det Type** field is "CHARGING PARAMETERS".

9.2.2 Charge States

The "charge state" is used to distinguish between the following three types of entries in the canonical invoice format:

1. **Normal:** Normal records are charges that are evaluated during shadow settlements.
2. **Cancellation:** Cancellation records are shadow settled differently than normal records. Instead of reproducing the charge type calculations, the application will instead look-up the original bill for this record and verify that the cancellation amount matches.
3. **Adjustment:** Adjustments are records that cannot be shadow settled – generally for ad-hoc charges for which no determinants are available (that is, determinants will come neither from static data nor from meter data messages).

In general, records in a backing sheet will be normal records. The following list details how the exceptions are identified:

- **ROI DuoS:** In this file, rows with a 2S, 2C, or 2D are *not* processed as normal records.
  - If these records indicate an *Adjustment Reference* (a reference to invoice item that is being cancelled) then the record is treated as a cancellation record. The referenced item will be queried and compared to the actual cancellation amount during shadow settlements.
  - If no *Adjustment Reference* is specified, the records are treated as adjustments.
- **ROI TuoS:** In this file, the *Inv Category* and *Inv Det Notes* fields are used to identify cancellation records. For other rows, charges for certain tariff codes (which are not in scope for shadow settlement) are treated as adjustments.
  - If the *Inv Category* field indicates "Rebill" and the *Inv Det Notes* field indicates "CREDIT NOTE" then this record is a cancellation. A matching charge from a previous invoice will be queried and compared to the actual credit amount during shadow settlements.
  - System Settings are used to identify which tariff codes are treated as adjustments. By default, ATS-D, ATS-T, COP1, and DSMC tariff codes are treated as adjustments. This list can be found in the following location in the System Settings hierarchy: **Global** > **MarketExchange** > **TDIE** > **TUoS** > **Adjustment Tariff Codes**.
- **NI UoS:** In these files, the charge type is used to determine if the record is a cancellation or adjustment record.

- If the charge type is prefixed with "CAN" then the record is a cancellation record. A matching charge from a previous or possibly current invoice will be queried and compared to the actual cancelled amount during shadow settlements.
- If the charge type is one of "CONSADJ" or "TTRE", or is prefixed with "BC-" then the charge is treated as an adjustment.

9.3 Static Data Validation

Once a backing sheet has been transformed to the canonical format described above, each record is validated according to the following rules:

1. If the record corresponds to an MPRN:
    a) Verify that an Account entity exists in the static data that corresponds to the specified MPRN.
    b) Verify that the Account entity is correctly configured:
        i. It is active for the date range specified in the invoice record.
        ii. It has a service location assignment for the date range specified.
        iii. It is associated with the correct EDC (ESBN or NIE, depending on jurisdiction of the invoice)
        iv. It is associated with the correct PSE. The Account is associated with a Supplier. The Account's Supplier is associated with a PSE that represents a SEM market participant. That PSE should correspond to the recipient indicated on the invoice.
        v. It is assigned to the same Tariff Code or DUoS Group as indicated in the invoice.
        vi. If the backing sheet indicates a MIC value, confirm that the assigned MIC for the Account in the static data matches.
    c) If the backing sheet indicates a Meter Serial Number, verify that a Meter entity exists in the static data that corresponds to that serial number.
2. Otherwise, the record corresponds to NQH MPRNs aggregated by Supplier Unit:
    a) Verify that a Service Point entity exists that corresponds to the specified Supplier Unit.
3. Verify that a Product entity exists that corresponds to the specified Tariff Code or DUoS Group.
4. Verify that a Charge Component entity exists that corresponds to the specified Tariff Code and Charge Type.
5. Verify that TOU Template and Period entities exist for the specified Timeslot Code in the invoice, if applicable.

If any entity is missing (that is, could not locate Account, Meter, Service Point, Product, Component, TOU Template, or TOU Period) then this record will be excluded from shadow settlement calculations. Other errors (like a misconfigured account) will be reported, but shadow settlement calculations can proceed.

All validation errors will be reported in the Process Log and can be viewed from the Account Variances diagnostic report (see section 12.1.2 Account Variances).

9.4 Shadow Settlement Calculations

Shadow settlement calculations are performed for each invoice backing sheet record.

If the record's **Charge State** field indicates that it is a normal record, the record is processed using the Retail Settlement/Billing Engine of Retail Operations. The general procedure followed by this engine is as follows:

- Look-up the **Charge Type** and **Rate Structure** for this charge. These are fields on the Charge Component entity that corresponds to the charge type being evaluated.
- When the record represents an Account or Meter entity, the determinants used in calculating the charge quantity will come from the meter data for that Account and/or Meter. If the record represents a Service Point (also known as POD – short for Point of Delivery), schedule data accepted from the load aggregation calculations are used to calculate charge quantities.
- The **Charge Type** field determines how the charge quantity is calculated. Refer to the online help system for more details on available charge types and associated logic for determining charge quantities.
- The **Rate Structure** field determines how the charge rate is calculated. It also determines what sort of input grids are shown to users when defining the rate information and characteristics of the Charge Component. Refer to the online help system for more details on available rate structures and associated logic for determining charge rates.
- A special Rate Structure is available called **Formula**. Formula charges allow for custom "iterators" (looping construct, similar to using for or while loops in a programming language) and data inputs. It also provides a formula language (based on Oracle SQL/PL-SQL) for defining custom intermediate variables and for defining the final charge quantity and rate values. Refer to the online help system for more details on the capabilities and configuration of formula charges.

If the record's *Charge State* field indicates that it is a cancellation record, a matching charge is searched and used for comparing the original billed amounts against the current cancelled amounts.

If the record's *Charge State* field indicates that it is an adjustment record, the values are "passed through". No shadow calculations are performed and the external values are accepted as internal.

9.5 SONI TUOS Supplier Charge Calculation

For the tariff year beginning October 2011, SONI (System Operator of Northern Ireland; the entity responsible for managing the electricity transmission system) has issued a new statement of charges which substantially simplifies the structure of transmission charges for suppliers. Rather than rates for dozens of tariff categories and several charge types, suppliers are charged at four TOU rates per kWh delivered. In addition, the volumes used are the aggregated supplier unit volumes – in other words, NDLF data from the PIR. The TOU rates correspond to the four supplier tariff categories:

1. Nov – Feb Winter Peak Units (ST01)
2. Nov – Feb Outside of Peak Weekday Units (ST02)
3. Nov – Feb Evening and Weekend units, including weekday units during Christmas period (ST03)
4. All other times including Christmas Holiday Period (ST04)

Peak hours are 1600-1900 Monday to Friday. Outside of peak weekday is 0800-2030, excluding 1600-1900, Monday to Friday. Evening is 2030-2230, and weekend is 0800-2230 Saturday and Sunday. ST01 and ST02 do not apply during the Christmas holiday period

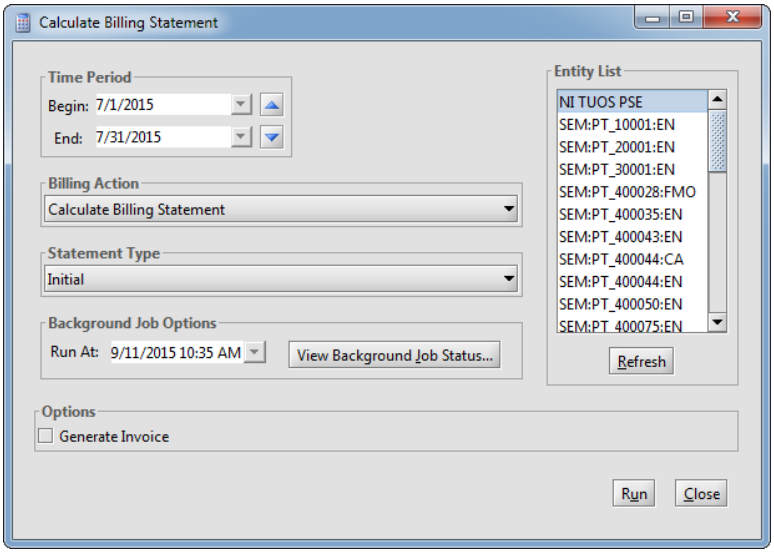
Because the charges are essentially levied based on NDLF data the TUoS charge calculation uses the wholesale PSE settlements process rather than the retail account settlements process. The charge calculation has the following two assumptions:

- The NI TUoS volume includes all net demand transactions with a supplier unit in Northern Ireland.
- A Northern Ireland supplier unit is identified as a service point with a SEM external system identifier beginning with "SU_5".

The NDLF and NDA volumes correspond to energy volumes, as differentiated from capacity or VMO NDLF/NDA volumes. For a given statement type, energy volumes energy used even if a different statement type has "best available" data – that is, unlike shadowing SEM capacity charges, the settlement calendar is not used for the TUoS calculation.

9.5.1 Running the Calculation

To calculate the SONI TUoS supplier charges, open the Calculate Billing dialog from the Run menu. Select "NI TUOS PSE" as the billing entity, and Initial for the Statement Type. Set the Begin Date and End Date to cover the days you wish to calculate, which will typically be a calendar month. Click the "Run" button on the dialog to kick off the calculation process.

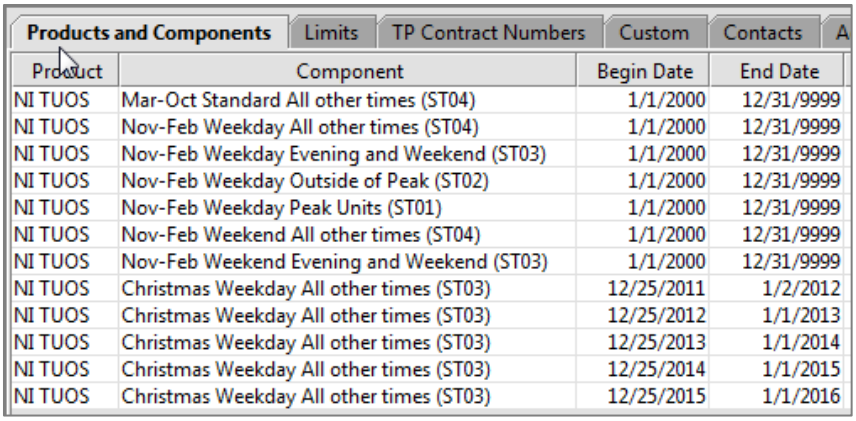


The bill calculation completes with summary results with the same reporting structure and the same time horizon as a Supplier TUOS Invoice Breakdown published by SONI. You can directly compare rows on the summary results view with line items listed on the hard-copy invoice breakdown.

9.5.2 Updates Required for Christmas Period

The Christmas period affects the ST01 and ST02 tariffs, as these tariffs are excluded from applying to the Christmas period. The Christmas Period Dates are published in the SONI Statement of Charges, and are typically 25th December to 1st January inclusive. Each year these dates are added/updated in the following entities:

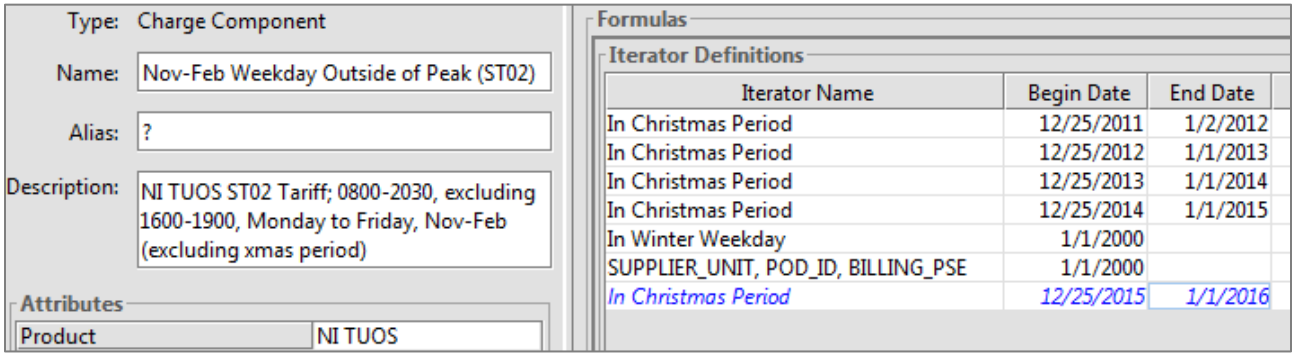
- Update the NI TUOS CONTRACT entity, located in the Entity Manager under Business Entity | Contract | Wholesale Contract. On the Products and Components sub-tab, add a row for the Christmas holiday period dates for the component "Christmas Weekday All other times (ST03)" and save the charge configuration. The screenshot below shows the updates through the 2015 holiday.



Products and Components | Limits | TP Contract Numbers | Custom | Contacts | A

Product	Component	Begin Date	End Date
NI TUOS	Mar-Oct Standard All other times (ST04)	1/1/2000	12/31/9999
NI TUOS	Nov-Feb Weekday All other times (ST04)	1/1/2000	12/31/9999
NI TUOS	Nov-Feb Weekday Evening and Weekend (ST03)	1/1/2000	12/31/9999
NI TUOS	Nov-Feb Weekday Outside of Peak (ST02)	1/1/2000	12/31/9999
NI TUOS	Nov-Feb Weekday Peak Units (ST01)	1/1/2000	12/31/9999
NI TUOS	Nov-Feb Weekend All other times (ST04)	1/1/2000	12/31/9999
NI TUOS	Nov-Feb Weekend Evening and Weekend (ST03)	1/1/2000	12/31/9999
NI TUOS	Christmas Weekday All other times (ST03)	12/25/2011	1/2/2012
NI TUOS	Christmas Weekday All other times (ST03)	12/25/2012	1/1/2013
NI TUOS	Christmas Weekday All other times (ST03)	12/25/2013	1/1/2014
NI TUOS	Christmas Weekday All other times (ST03)	12/25/2014	1/1/2015
NI TUOS	Christmas Weekday All other times (ST03)	12/25/2015	1/1/2016

- The Christmas period dates must also be added to the Iterator Definitions for two charge components, "Nov-Feb Weekday Peak Units (ST01)" and "Nov-Feb Weekday Outside of Peak (ST02)". These entities are located in the Entity Manager under Products and Rates | Charge Component. On each component select the "In Christmas Period" iterator in the top-most grid, right-click, and select Duplicate Row from the context menu. Update the Begin Date and End Date fields with the same dates added to the NI TUOS CONTRACT entity and save the charge configuration. The screenshots below shows the unsaved changes for the 2015 holiday period.



Type: Charge Component

Name: Nov-Feb Weekday Outside of Peak (ST02)

Alias: ?

Description: NI TUOS ST02 Tariff; 0800-2030, excluding 1600-1900, Monday to Friday, Nov-Feb (excluding xmas period)

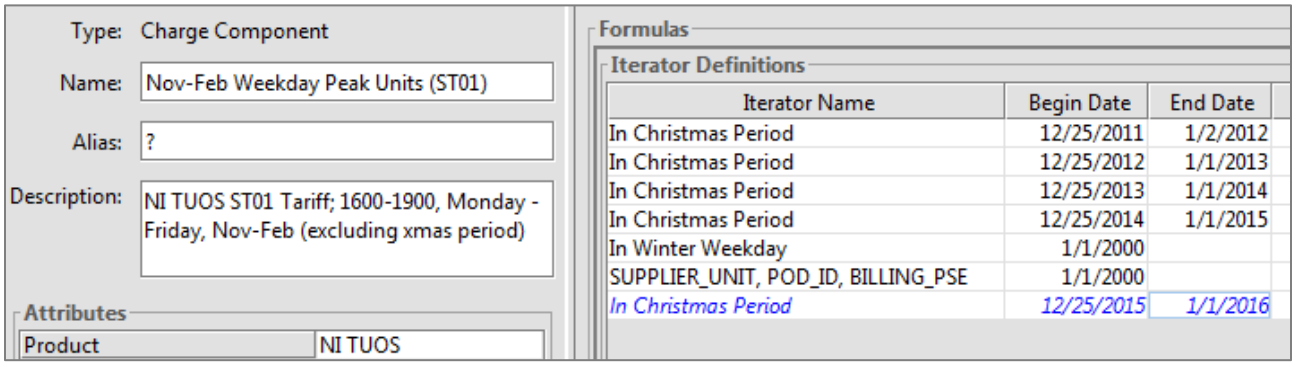
Attributes

Product	NI TUOS

Formulas

Iterator Definitions

Iterator Name	Begin Date	End Date
In Christmas Period	12/25/2011	1/2/2012
In Christmas Period	12/25/2012	1/1/2013
In Christmas Period	12/25/2013	1/1/2014
In Christmas Period	12/25/2014	1/1/2015
In Winter Weekday	1/1/2000	
SUPPLIER_UNIT, POD_ID, BILLING_PSE	1/1/2000	
In Christmas Period	*12/25/2015*	*1/1/2016*


Type: Charge Component
Name: Nov-Feb Weekday Peak Units (ST01)
Alias: ?
Description: NI TUOS ST01 Tariff; 1600-1900, Monday - Friday, Nov-Feb (excluding xmas period)
Attributes
Product NI TUOS
Formulas
Iterator Definitions
Iterator Name Begin Date End Date
In Christmas Period 12/25/2011 1/2/2012
In Christmas Period 12/25/2012 1/1/2013
In Christmas Period 12/25/2013 1/1/2014
In Christmas Period 12/25/2014 1/1/2015
In Winter Weekday 1/1/2000
SUPPLIER_UNIT, POD_ID, BILLING_PSE 1/1/2000
In Christmas Period 12/25/2015 1/1/2016

Chapter 10: CCL/PSO/SSS Invoices

CCL, PSO, and SSS invoices do not have backing sheets. Instead of running settlement calculations based on the contents of a backing sheet, the system will estimate invoices by generating backing-sheet-level details and using the *Retail Settlement/Billing Engine* in Retail Operations to calculate the charge amounts.

Since invoice backing sheets are not imported, users must create new invoices – providing some basic parameters as inputs – and then run settlement calculations.

To manage these invoices, follow these steps:

1. Login to the application
2. From the home page menu, select the following option: **SEM Operations** > **IE T&D** > **Financial Settlements**
3. Then select the following report from the upper-left drop-down of report names: **CCL/PSO/SSS Invoice Management**

You can refine the list of invoices that are shown in the data grid by filtering them on the following criteria:

- **Date Range:** Select a range of dates in the toolbar. Only invoices whose Invoice Date falls in this range are shown.
- **Invoice Type:** Choose the invoice type from a drop-down list. You can select <All> to show all invoices unfiltered by type. The list contains the following options:
  - CCL
  - PSO (NI)
  - PSO (ROI)
  - SSS
- **Recipient:** Choose the recipient of the invoice from a drop-down list. You can select <All> to show all invoices unfiltered by recipient. The recipient will correspond to a SEM market participant. via its PSE External System Identifier

Each row in the data grid represents an invoice that matches the selected criteria. This view includes the following information:

- **Run?** This checkbox column should be checked to include this invoice when running shadow settlements.
- **Invoice Date:** This column indicates the date the invoice was issued.
- **Invoice Type:** The invoice type.
- **Recipient:** The recipient of the invoice.
- **Period Begin Date, Period End Date:** The date range to be used when querying volume determinants for the charge quantities.
- **Invoice Number:** The invoice number.
- **Last Run Date:** The date and time on which this invoice was last included in running shadow settlements. If this column is blank, it has never been included in a run.
- **Last Run Status:** The process status for the last time the invoice was included in running shadow settlements. This will be blank if the invoice has never been included in a run.
- **Total Internal Charges:** The total charges calculated for this invoice during shadow settlements, *excluding* VAT.
- **Total Internal VAT:** The total VAT calculated for this invoice during shadow settlements.

- **Total Internal Amount:** The total gross charges calculated for this invoice during shadow settlements, including VAT.

For invoices that have been shadow settled, you can examine detailed settlement results and comparisons by right-clicking on the row and selecting the option named **Settlement Results**. See Shadow Settlement Results.

10.1 Creating and Updating Invoice Entries

Since backing sheets are not imported for these invoices, new entries are added by adding new rows into the grid on the **CCL/PSO/SSS Invoice Management** report.

To create a new invoice record, right-click in the grid and select **Insert Row**. Then enter information for the following columns:

- Invoice Date
- Invoice Type
- Recipient
- Period Begin Date
- Period End Date
- Invoice Number

After entering this information, click the **Save** toolbar button (or **File** > **Save** from the main menu).

After an entry has been created, it can be included in shadow settlements (see next section).

If you need to change an entry follow these steps:

- If you only need to change the *Invoice Number* field, change it in the report grid and click the Save toolbar button.
- If you need to change any of the other fields, you must delete the existing entry and create a new one. To delete an existing entry, select the row for that entry in the grid, right-click, and select **Delete Row**. Then add another entry following the steps above. The old record will be removed upon saving your changes in this grid.

10.2 Running Shadow Settlements

To calculate (or re-calculate) shadow settlements for an invoice backing sheet, check the box in the **Run** column for that invoice, select a Statement Type from the drop-down on the left (in the box labeled *Run*), and click the button labeled *Run Financial Settlements*.

To calculate settlements for multiple invoices, check the boxes for multiple invoices.

Running shadow settlements will result in process entries in the Process Log. For each execution, there will be a process named **PSO/CCL/SSS Invoices**. This "master" process entry will include information on the status of each invoice executed. There will *also* be one process for *each* invoice included in the calculations. These additional processes will have more detail and log events that occurred during processing of an individual invoice. These processes will be named **Single Invoice Settlement**.

Backing-sheet-level details include the following data:

- **Charge Component:** The charge type applied to this MPRN for this date range.
- **Account:** Corresponds to the MPRN

- **Begin Date, End Date:** The date range for which to query determinants (generally corresponds to meter periods for NHH MPRNs and to calendar month/invoice date range for HH MPRNs).

The sections below describe how the backing-sheet-level of detail is generated.

The set of records generated by these steps are then processed using the *Retail Settlement/Billing Engine* in Retail Operations. This engine is responsible for querying for charge quantities (meter data) and rates (charge component definition) and then calculating charge amounts for each record. See section 9.4 Shadow Settlement Calculations for more details (note that all records for CCL, PSO, and SS invoices are processed as normal records – no cancellations or adjustments are generated by the steps described below).

10.2.1 NI CCL Invoices

Backing-sheet-level records for CCL invoices are generated using the following procedure:

- Query for the CCL Product entity and all applicable associated Charge Component entities.
- Identify all *Account* Entity Groups that have a custom attribute named "Subject to CCL" whose value is *checked*.
  - These groups form a hierarchy of the Entity Groups representing NI Tariff Codes. By default, there are thirteen groups with a category of 'NI SSS/PSO'. The NI Tariff Code groups (whose category is 'Distribution Group') are assigned to one of these thirteen groups.
  - By default, all of these groups are subject to CCL *except* two: Domestic Economy 7 and Domestic Standard 7.
- Enumerate all Accounts (which correspond to MPRNs) assigned to these Entity Groups.
  - Verify that only NI Accounts are included (that is, assigned to the EDC named NIE).
- For Accounts that represent NHH MPRNs, identify all meter periods occurring during the invoice period (based on the Period Begin Date and Period End Date fields entered for the invoice). These meter periods will be the date ranges used for querying charge quantities.
  - A meter period occurs during the invoice period if its "end date" (the read date) is during the invoice period.
- For Accounts that represent HH MPRNs, the invoice period itself will be the date range used for querying charge quantities.

10.2.2 NI PSO and SSS Invoices

Backing-sheet-level records for NI PSO and SSS invoices are generated using the same procedure as follows:

- Query for the "PSO (NI)" or "SSS" Product entity (depending on invoice type) and all applicable associated Charge Component entities.
- For each Charge Component, if the Charge Type is "Tax" then it applies to all Accounts (and represents VAT).
- Otherwise (not VAT), enumerate the applicable Accounts as follows:
  - Query for the *Account* Entity Group that corresponds to the component.
  - These groups form a hierarchy of the Entity Groups representing NI Tariff Codes. By default, there are thirteen Charge Components (other than VAT) which each correspond to one of thirteen groups with a category of 'NI SSS/PSO'. The NI Tariff Code groups (whose category is 'Distribution Group') are assigned to one of these thirteen groups.
  - Enumerate all Accounts (which correspond to MPRNs) assigned to this Entity Group.
    - Verify that only NI Accounts are included (that is, assigned to the EDC named NIE).

- For Accounts that represent NHH MPRNs, identify all meter periods occurring during the invoice period (based on the Period Begin Date and Period End Date fields entered for the invoice). These meter periods will be the date ranges used for querying charge quantities.
    - A meter period occurs during the invoice period if its "end date" (the read date) is during the invoice period.
- For Accounts that represent HH MPRNs, the invoice period itself will be the date range used for querying charge quantities.

10.2.3 ROI PSO Invoices

The backing-sheet-level records for ROI PSO invoices are the simplest. The process simply generates rows at the invoice level of detail – instead of MPRN level of detail. Drilling down from the settlement results screens allows users to drill into list of applicable MPRNs for each of the three ROI PSO charges.

- Query for the "PSO (ROI)" Product entity and all applicable associated Charge Component entities.
- Use "Not Assigned" for the Account entity (indicating that charges are not calculated at that level of detail)
- Use the invoice period for the date range.

Chapter 11: Shadow Settlement Results

Several reports are provided for viewing the results of shadow settlement calculations.

These reports allow for comparisons of external (backing sheet) values against those calculated internally (during shadow settlements). They also provide summary views with drill-down capability, allowing users to drill all the way into the details behind an individual charge for an individual MPRN.

To access these reports, do the following:

- Login to the application
- From the home page menu, select the following option: **SEM Operations** > **IE T&D** > **Settlement Results**

There are two reports in the report drop-down in the upper-left of this screen. Both reports share a common set of report filters in the left-hand panel:

- **Invoice Sender:** A drop-down list from which you select the sender of the invoice you want to examine. There is an <All> option so that invoices from all senders can be presented.
- **Invoice Recipient:** A drop-down list from which you select the recipient of the invoice. There is an <All> option to show invoices unfiltered.
- **Invoice:** A drop-down list from which you must select *one* invoice to examine. The invoices are listed in the following format:

  `Sender: Invoice Number (Invoice Date YYYY-MM-DD)`

  This list will be filtered, showing only invoices that meet the following criteria.

  - Invoice Date**:** The invoice date must fall between the begin and dates selected on the toolbar in order to show up in this drop-down list.
  - Invoice Sender**:** Unless <All> is selected, the invoice's sender must match this selection in order to show up in this drop-down list.
  - Invoice Recipient**:** Unless <All> is selected, the invoice's recipient must match this selection in order to show up in this drop-down list.
- **Product:** A drop-down list allowing you to filter results by a particular Product. (Products are analogous to DUoS Groups/Tariff Codes.) There is an <All> selection, allowing all results for all products to be displayed. There is also a checkbox to the right. The semantics of this checkbox depend on which report you are viewing (see following sections for details).
- **Component:** A drop-down list allowing you to filter results by a particular Charge Component. There is an <All> selection, allowing all results for all components to be displayed. There is also a checkbox to the right. The semantics of this checkbox depend on which report you are viewing (see following sections for details).
- **Account/POD:** This filter is only shown on the Retail Invoice Details report. It allows detail records to be filtered based on search criteria on the account or POD (service point) name or external identifier. The account external identifier should coincide with the MPRN number. The POD external identifier should coincide with the SEM Supplier Unit name.
- **Threshold:** For invoices that have external values (that is, those with backing sheets: TUoS and DUoS invoices), you can have the report filter the results so that only those with variances that exceed the specified threshold are shown.
  - **Charge Total:** In this mode, the only rows shown are those where the absolute difference between external (backing sheet) and internal (shadow settlement results) charge amounts exceeds the value specified.

- **Charge %:** In this mode, the only rows shown are those where the absolute percent difference between external (backing sheet) and internal (shadow settlement results) charge amounts exceeds the value specified.
- **Charge Total:** In this mode, the only rows shown are those where the absolute difference between external (backing sheet) and internal (shadow settlement results) charge amounts exceeds the value specified.
- **Charge %:** In this mode, the only rows shown are those where the absolute percent difference between external (backing sheet) and internal (shadow settlement results) charge amounts exceeds the value specified.

- **Show Sub-Total:** If this box is checked then sub-totals will be shown. Sub-total semantics depend on which report you are viewing and on whether the product or component checkboxes are checked (see the following sections for details).

Please note that these reports show results from generic structures from within Retail Operations. For that reason, labels show Account Names and POD (Service Point) Names – elements of the Retail Operations data model –instead of MPRNs and SEM Supplier Units. Account External Identifiers should generally show MPRN numbers and POD External Identifiers should generally show SEM Supplier Units. Similarly, columns that indicate DUoS Groups/Tariff Codes and Charge Types will be labeled Products and Components - which are the building blocks of the *Retail Settlement / Billing Engine* in Retail Operations (the same core functionality used for SEM Shadow Settlements in Market Operations).

Further details on the two reports are in the following two sections.

11.1 Retail Invoice Sum mary

The Retail Invoice Summary report shows summary-level data. Results are rolled up to invoice, product, or component levels of detail.

To view account-level details, you should use the Retail Invoice Details report (next section). You can also drill into these details from the Retail Invoice Summary report, allowing investigation and analysis of results to progress naturally from the summary, drilling down into the details supporting those summary values.

The Retail Invoice Summary report operates in three ways:

1. **Invoice Summary:** This is shown when *neither* the Product nor Component checkboxes are checked.
    a) The report will show a single row that summarizes the amounts in the invoice across selected products and components.
    b) No totals or sub-totals are necessary. (The Show Sub-Total checkbox has no effect.)
2. **Product Summary:** This is shown when the Product checkbox is checked but the Component checkbox is *not* checked.
    a) The report will show one row per product that summarizes the amounts in the invoice for that product across selected components.
    b) A total for the whole invoice is shown at the bottom. No sub-totals are necessary. (The Show Sub-Total checkbox has no effect.)
3. **Component Summary:** This is shown when the Component checkbox is checked – whether the Product checkbox is checked or not.
    a) The report will show one row per component that summarizes the amounts for that component (across all accounts). If the Product checkbox is checked, the product associated with each row is also shown in the grid.
    b) A total for the whole invoice is shown at the bottom. If the Product checkbox is checked and the Show Sub-Total checkbox is checked, there will also be a sub-total shown for each product.

The report shows the following columns in the data grid:

- **Invoice Date:** The invoice date for the selected invoice.
- **Invoice Sender:** The sender of the selected invoice.
- **Invoice Recipient:** The recipient of the selected invoice.
- **Product:** The name of the product for this result row. (Only shown when the Product checkbox is checked.)
- **Component:** The name of the charge component for this result row. (Only shown when the Component checkbox is checked.)
- **Period:** The name of the TOU period for this result row. (Only shown when the Component checkbox is checked.)
- **Total Invoice Volumes:** The total external volumes/charge quantities for this row. (Only shown for invoices with backing sheets – hidden for CCL, PSO, and SSS invoices.)
- **Total Invoice Charges:** The total external charge amounts for this row. (Only shown for invoices with backing sheets – hidden for CCL, PSO, and SSS invoices.)
- **Internal Volumes:** The total internal volumes/charge quantities for this row, as calculated during shadow settlements.
- **Internal Charges:** The total internal charge amounts for this row, as calculated during shadow settlements.
- **Volume Difference:** The difference between the external and internal volumes for this row. (Only shown for invoices with backing sheets – hidden for CCL, PSO, and SSS invoices.)
- **Volume %:** The percent difference between the external and internal volumes for this row. (Only shown for invoices with backing sheets – hidden for CCL, PSO, and SSS invoices.)
- **Charge Difference:** The difference between the external and internal charge amounts for this row. (Only shown for invoices with backing sheets – hidden for CCL, PSO, and SSS invoices.)
- **Charge %:** The percent difference between the external and internal charge amounts for this row. (Only shown for invoices with backing sheets – hidden for CCL, PSO, and SSS invoices.)

From the report grid, the user can drill-down into more details behind a row by double-clicking the row or right-clicking on the row and selecting **Details**. This will change the view to the Retail Invoice Details report and pre-select the filter values to show the details behind the selected row.

11.2 Retail Invoice Details

The Retail Invoice Details report shows detail data, allowing users to see results for individual accounts.

The Retail Invoice Detail report operates in two ways:

1. **Account Summary:** This is shown when Component checkbox is *not* checked.
    a) The report will show a single row per matching account (or POD) that summarizes the amounts in the invoice across selected products and components. If the Product checkbox is checked, the results will include the Product name (analogous to DUoS Group or Tariff Code) for each row.
    b) A total for all matching Accounts and PODs is shown at the bottom. If the Product checkbox is checked and the Show Sub-Totals checkbox is checked, there will also be a sub-total shown for each Product.
2. **Component Details:** This is shown when the Component checkbox is checked – whether the Product checkbox is checked or not.
    a) The report will show one row that provides charge amount details for each matching Account (or POD) and matching component. If the Product checkbox is checked, the product associated with each row is also shown in the grid.
    b) A total for all matching Accounts and PODs is shown at the bottom. If the Product checkbox is checked and the Show Sub-Total checkbox is checked, there will also be sub-totals by Account/POD and by Product. If the Product checkbox is *not* checked but the Show Sub-Total checkbox is checked, sub-totals will only be shown by Account/POD.

The report shows the following columns in the data grid:

- **Invoice Date:** The invoice date for the selected invoice.
- **Invoice Sender:** The sender of the selected invoice.
- **Invoice Recipient:** The recipient of the selected invoice.
- **Product:** The name of the product for this result row. (Only shown when the Product checkbox is checked.)
- **Entity Type:** Either "Account" or "POD", depending on the type of detail record shown. (POD records will be seen on ROI TUoS invoices for charges applied to NQH volumes that are aggregated to the Supplier Unit.)
- **Account/POD Name:** The name of the account or POD for this row.
- **Account/POD Ext Ident:** The external identifier of the account or POD.
- **Meter Name:** The name of the meter for this row if applicable. (This optional column will only be seen on NI UoS invoices for charges where a meter serial number was specified).
- **Component:** The name of the charge component for this result row. (Only shown when the Component checkbox is checked.)
- **Period:** The name of the TOU period for this result row. (Only shown when the Component checkbox is checked.)
- **Begin Date, End Date:** The date range for the billing period of this row.
- **Total Invoice Volumes:** The total *external* volumes/charge quantities for this row. (Only shown for invoices with backing sheets – hidden for CCL, PSO, and SSS invoices.)
- **Total Invoice Charges:** The total external charge amounts for this row. (Only shown for invoices with backing sheets – hidden for CCL, PSO, and SSS invoices.)

- **Invoice Rate:** The effective external rate for this row – a weighted average rate calculated as total charges divided by total volumes. (Only shown for invoices with backing sheets – hidden for CCL, PSO, and SSS invoices.)
- **Internal Volumes:** The total *internal* volumes/charge quantities for this row, as calculated during shadow settlements.
- **Internal Charges:** The total internal charge amounts for this row, as calculated during shadow settlements.
- **Internal Rate:** The effective internal rate for this row – a weighted average rate calculated as total charges divided by total volumes.
- **Volume Difference:** The difference between the external and internal volumes for this row. (Only shown for invoices with backing sheets – hidden for CCL, PSO, and SSS invoices.)
- **Volume %:** The percent difference between the external and internal volumes for this row. (Only shown for invoices with backing sheets – hidden for CCL, PSO, and SSS invoices.)
- **Charge Difference:** The difference between the external and internal charge amounts for this row. (Only shown for invoices with backing sheets – hidden for CCL, PSO, and SSS invoices.)
- **Charge %:** The percent difference between the external and internal charge amounts for this row. (Only shown for invoices with backing sheets – hidden for CCL, PSO, and SSS invoices.)

From the report grid, the user can drill-down into more details behind a row by double-clicking the row or right-clicking on the row and selecting **Pricing Result Details**. This will open the Pricing Result Details dialog (described in the next section).

Other right-click options include **Account Details** (which will show the Account and Meter Details view for the selected account when the *Entity Type* for the selected row is "Account"), **POD Details** (which will show the Entity Manager view for the selected service point when the *Entity Type* for the selected row is "POD"), and **Account History** (which will navigate the user to the Account History view for the selected account when the *Entity Type* for the selected row is "Account").

Refer to the online help system for more information on the Account and Meter Details and Entity Manager views. See section 12.2.1 Account History for more details on the Account History view.

11.2.1 Pricing Result Details

The Pricing Result Details dialog provides greater detail behind a single charge result for a given account and charge component.

Not all charges have supporting details. You can access this dialog from any charge, but many will have the same information as the Retail Invoice Details report – nothing more.

Examples of charges that will have additional supporting details include components whose rates can change during a bill period – in which case the effective (weighted average) rate is shown in the Retail Invoice Details report and the details of those multiple rates will be available in the Pricing Result Details.

Formula charge components can generate large amounts of intermediate results that are captured during the bill calculation, too. These details are accessible from the Pricing Result Details dialog.

Users can access pricing result details by double-clicking a row in the Retail Invoice Details report (or right-clicking and selecting **Pricing Result Details**).

The dialog displays the following fields:

Field Name	Applies To *	Description
Taxed Product	**Tax** charge type	The product name for the charge that is subject to tax.
Taxed Component	**Tax** charge type	The component name for the charge that is subject to tax.
Child Component	**Combination** and **Composite** rate structures	The child component that was evaluated.
Period	**Time of Use** rate structure	The TOU period for these results.
Tier	**Tiered** and **Imbalance** rate structures	The Tier Number (for Tiered charges) or Imbalance Band Number (for Imbalance charges) for these results.
Begin Date	*All*	The start date of the charge.
End Date	*All*	The end date of the charge.
Number of Intervals	*All*	The number of intervals for these results.
Demand Hours	**Demand Hours** charge type	The demand hours value for these results.
Factor	*All*	The charge factor – comes from the *Percentage* attributes of the Charge Component entity.
Quantity	*All*	The charge quantity.
Rate	*All*	The charge rate.
Amount	*All*	The charge amount (product of factor, quantity, and rate).
Determinant Status	*All*	The status of determinants used in formulating the charge quantity. This will be one of: **OK**: All input determinants found. **Partial**: Some input determinants found. Meter or schedule data may be partially missing/absent. **Missing**: No input determinants found.
…	**Formula** rate structure	This will indicate an asterisk when there are further drill-down details. Drilling into this row will show Formula charge details behind the selected row. See the next section for more details.

* When viewing details, if a particular field does not apply, it will be hidden.

11.2.2 Formula Charge Details

The Formula Charge Details dialog shows all of the intermediate results generated from the evaluation of a charge component with a Formula rate structure.

It can be accessed from the Pricing Result Details dialog when viewing pricing result details for a charge component with a Formula rate structure.

This screen will show the following fields:

- **Charge Date:** This field will indicate the interval corresponding to this row of results. For charges with an interval of Meter Period, it will show a date range that corresponds to the meter period.
- **Iterators:** A formula charge allows up to ten "iterators", which provide support for a looping construct when evaluating formulas. If a charge is defined using iterators, they will be shown between the charge date and quantity.
- **Charge Quantity:** The charge quantity that resulted from evaluating the quantity formula for this row of results.
- **Charge Rate:** The charge rate that resulted from evaluating the rate formula for this row of results.
- **Charge Factor:** The charge factor as defined by the *Percentage* attributes for the Charge Component.
- **Charge Amount:** The charge amount for this row – the product of the quantity, rate, and factor.
- **Variables:** Formula charges can define data inputs and intermediate variables as "persistent", meaning they are recorded during evaluation and shown in this screen. The values of persisted variables will be shown for each row in a set of columns to the right of the charge amount.

Chapter 12: Diagnostic Tools

Several reports are available for assessing the contents of a backing sheet, for identifying validation errors during shadow settlements, and for identifying certain anomalous conditions (like an active MPRN that has not been included in a DUoS invoice for six months).

12.1 Backing Sheet Reports

The first three diagnostic reports are available only for TUoS and DUoS invoices. They do not apply to CCL, PSO, or SSS invoices.

All of these reports are available from right-click menus on both the summary and detail grids on the DUoS, TUoS, and UoS views. See section 8.2 Viewing Imported Backing Sheets for more details on these views.

12.1.1 Uninvoiced Accounts

The Uninvoiced Accounts report shows a listing of all accounts/MPRNs that were *not* invoiced in the selected backing sheet. Many NQH/NHH MPRNs are metered once every other month, so it is expected that this list will include numerous NQH/NHH MPRNs for every invoice.

This report shows the following fields:

- **Account Name:** The account's name per the static data.
- **MPRN:** The MPRN for this account.
- **Internal Tariff:** The DUoS Group for this MPRN per the static data.
- **Internal MIC:** The MIC value for this MPRN per the static data.

12.1.2 Account Variances

The Account Variances report shows exceptions that occurred during the validation of static data for an invoice (see section 9.3 Static Data Validation for more details).

This report shows the following fields for each exception/variance identified during validation:

- **Account Name:** The name of the account per the static data. If no account was found that corresponds to the MPRN then this field will be blank.
- **MPRN:** The MPRN for the invoice record. If the account name is blank then no account could be found for this MPRN.
- **Meter Name:** The name of the meter per the static data. If no meter was found that corresponds to the serial number then this field will be blank. This is not applicable for invoice records that do not indicate a meter serial number.
- Meter Serial Number**:** The serial number for the invoice record. If the meter name is blank then no meter could be found for this serial number. This field is not applicable for invoice records that do not indicate a meter serial number.
- **Internal EDC:** The EDC assignment for this account per the static data.
- **External EDC:** The EDC assignment expected based on the invoice (ESBN for ROI invoices; NIE for NI invoices).
- **Internal PSE:** The PSE assignment for this account – per the account's assigned ESP (supplier) in the static data.

- **External PSE:** The PSE assignment expected. This is the invoice recipient.
- **Internal Tariff:** The DUoS Group or Tariff Code for the account – per the account's entity group assignments in the static data.
- **External Tariff:** The DUoS Group or Tariff Code for the invoice record.
- **Internal MIC:** The MIC value for this account per the static data.
- **External MIC:** The MIC value indicated by the invoice record. For invoice backing sheets in the NI UoS format, this field will be blank as those files do not indicate a MIC value.

12.1.3 Missing Settlement Determinants

The Missing Settlement Determinants report identifies metered usage data (needed to compute charge quantities during shadow settlements) that is missing.

This report shows the following fields for charge where input determinants were not found in whole:

- **Account Name:** The account's name per the static data.
- **MPRN:** The MPRN for this account.
- **Meter Name:** The meter name per the static data. This is not applicable for invoice records that do not indicate a meter serial number.
- **Meter Period Begin Date, Meter Period End Date:** The date range of the invoice record for which metered usage data is missing.
- **Component Name:** The charge component name for the invoice record.
- **Period Name:** The TOU period name for the invoice record (optional).
- **Units:** The unit of measure of the determinants.
- **Volume:** The total volumes / determinant values found for this account, date range, and unit of measure. (Will be zero if no usage was found.)
- **Determinant Status:** The status of the determinants as identified during shadow settlement calculations. This will either be *Partial* (meaning that some metered usage data was found but not all) or *Missing* (**meaning that no applicable metered usage data was found**).

12.2 Account History Reports

The Account History view includes three additional diagnostic reports. They are described in detail in the following sections.

12.2.1 Account History

The Account History report shows meter data for a specified account/MPRN as well as references to that account/MPRN from imported invoice backing sheets.

The following filters are used to identify an account whose history is to be shown:

- **Interval Type:** Non-Interval (NQH/NHH) or Interval (QH/HH)
- **MPRN/Account:** This filter allows searching for accounts/MPRNs – either by MPRN or by account name – and shows the results of the search. Accounts shown will only include NQH/NHH accounts if the *Interval Type* is set to Non-Interval and will only include QH/HH accounts if the *Interval Type* is set to Interval.

Furthermore, there is a final report filter used to show backing sheet records for the specified account:

- **Sender:** The invoice sender. The lower grid of the report will show raw backing sheet records that pertain to the selected account for invoices issued by this sender.

The top report grid shows metered usage data for the selected account.

- For Non-Interval data, the following columns are shown:
  - **Date/Time:** The date and time for the interval meter data record.
  - **Total:** The total metered usage for this date and time for all meters for the selected MPRN.
  - **Meters:** To the right of the total column will be a set of columns for each meter for the selected MPRN.
    - **Net Usage:** The total KWh consumption for this meter for this date and time.
    - **Import – KVAR:** The import KVAR reading for this meter for this date and time.
    - **Import – KW:** The import KW reading for this meter for this date and time.
    - **Export – KVAR:** The import KVAR reading for this meter for this date and time.
    - **Export – KW:** The import KW reading for this meter for this date and time.
  - For Interval data, the following columns are shown:
    - **Meter Name:** The meter name for the meter read.
    - **Begin Date:** The begin date of the meter read.
    - **End Date:** The end date (read date) for this meter read.
    - **Period:** The TOU period for this meter read.
    - **Metered Usage:** The meter read value.
    - **Units:** The unit of measurement for this meter read.
    - **Invoice Date:** The invoice date of the DUoS invoice in which this meter read was invoiced.
    - **Withdrawn?:** This box will be checked if this meter read has been withdrawn (via 300W message) and not yet replaced with a newer meter read.

The bottom report grid shows backing sheet records. The columns shown in this grid will be the same as the columns shown in the bottom grids of the *MPRN Details* / *Account Details* detail type reports on the DUoS, TUoS, and UoS views (see section 8.2 Viewing Imported Backing Sheets for more details on these views).

This report can also be conveniently accessed via a right-click menu on the Retail Invoice Details report grid.

12.2.2 Unsettled Accounts

The Unsettled Accounts report lists accounts and consumption records that have not appeared in invoice backing sheets over a specified period of time.

There is only one filter value that the user must specify:

- **Days Back:** This defines the period of time to examine. The report grid will indicate all NQH/NHH MPRNs and associated meter reads that have *not* appeared in DUoS invoices. Only meter read records where the read data falls between the current date/time and the specified number of days back will be shown.

  Example: You refresh the report and the current date/time is 11:30am on September 16th, 2010. The **Days Back** filter is set to 60. Consumption records received since July 18th, 2010 will be shown.

The report grid shows the following fields:

- **MPRN:** The MPRN for this unsettled meter read.
- **Account Name:** The account name for this meter read (per the static data).
- **Meter Name:** The meter name for the meter read.
- **Rate Code:** The DUoS Group for this MPRN (per the static data).
- **Withdrawn?:** This box will be checked if this meter read has been withdrawn (via 300W message) and not yet replaced with a newer meter read.
- **Begin Date:** The begin date of the meter read.
- **End Date:** The end date (read date) for this meter read.
- **Period:** The TOU period for this meter read.
- **Metered Usage:** The meter read value.
- **Units:** The unit of measurement for this meter read.
- **Received Date:** The date and time this meter read message was imported.

12.2.3 Unmetered Accounts

The Unmetered Accounts report lists active accounts that have not received any meter read data over a specified period of time.

There is only one filter value that the user must specify:

- **Days Back:** This defines the period of time to examine. The report grid will indicate all MPRNs which have received no meter data between the current date/time and the specified number of days back.

  Example: You refresh the report and the current date/time is 11:30am on September 16th, 2010. The **Days Back** filter is set to 60. MPRNs for which no meter data has been received since July 18th, 2010 will be shown.

The report grid shows the following fields:

- **MPRN:** The MPRN for which no meter read has been received.
- **Account Name:** The account name for this MPRN (per the static data).
- **Rate Code:** The DUoS Group for this MPRN (per the static data).
- **ESP Begin Date, ESP End Date:** The effective dates for the enrollment of this MRPN with its current supplier.

Details for this MPRN can be accessed by right-clicking a row and choosing **Account Details**. This will show the Account and Meter Details view for the selected account.

Chapter 13: Maintaining Charge Components

Product and Charge Component entities needed for shadow settlement of TUoS, DUoS, CCL, PSO, and SSS invoices are included with the application. However, tariff rates change (typically yearly), so maintenance of the rates will be a user function.

For more details on loading these entities into the application database, see section 2.3 Shadow Settlement Configuration Files.

Product and Charge Component entities can be viewed and edited using either the Entity Manager (**Tools** > **Entity Manager** in the application main menu – in the Products and Rates category) or the Products and Rates dialog (**Tools** > **Products and Rates** in the main menu).

These views provide property-page-style interfaces for editing all attributes related to these entities, including the rates.

For simpler operation, you can instead use the Rate Management tab of the Products and Rates dialog. This provides a data grid that allows users to manage the rates for charge components in bulk.

See the online help system for more information on these views.

Appendix A: Aggregated Demand Data Exceptions

Exceptions that can occur during import/processing of aggregated demand data:

- **ORA-20049: Data Import Error**
  - **Invalid MESSAGE_TYPE_CODE**

    This error occurs when the parsing of the NI CSV file (that contains aggregated data – analogous to 59x MRSO files) cannot determine the appropriate message type code for a given line. Based on the Imp/Exp Indicator, and Meter Value Indicator columns, it tries to infer a message type code of N591, N595, or N598. Note that lines where the Line Loss Indicator is "N" are ignored.
- **ORA-20000: General Exception**
  - **No revision calendar entry found for run indicator <Settlement Run Indicator> on settlement date <Settlement Date>**

    This error occurs when insufficient data is found in the SEM revision calendar for the application to determine the suitable statement type for storing schedule data based on the settlement run indicator found in the message XML file. Note that a settlement run indicator of *30* corresponds to "M+4", *40* corresponds to "M+13", and *50* corresponds to "Ad-hoc".

Warnings that can occur during import/processing of aggregated demand data

- **Existing data within the database is newer than the file being loaded.**

  This warning occurs when a 591, 595, 596, 598, or NI CSV file already exists for the same operating data and is newer (per market timestamp in the message). The newer data is left and the older data in the incoming file is ignored.

Appendix B: Meter Data Exceptions

Exceptions that can occur during import/processing of meter data:

- **ORA-20000: General Exception**
  - **Matching 3XX message contains an error in TDIE_300_EXCEPTION for NETWORKS_REFERENCE_NUMBER=<Network Ref #>**

    This indicates that the message being withdrawn by a withdrawal message was never successfully imported in the first place, so the withdrawal processing is skipped.
  - **Register Type Code <Register Type Code>' is unrecognized; the op code could not be determined for the channel.**

    The "operation code" (an attribute used inside the Retail Operations data model for computing net usage from multiple meter channels) could not be determined for the specified register type code. A mapping is defined in the System Dictionary that maps register type codes to op codes: **Global** > **MarketExchange** > **TDIE** > **RegisterTypeCodeMapping**.
- **ORA-20003: Entry Already Exists**
  - **A file import already exists with a MARKET_TIMESTAMP that is newer than the one in this file.**

    This error occurs when a 3XX XML file is imported but is older than a corresponding file that has already been loaded. The newer data is retained and the older file provided is ignored.
- **ORA-20004: No Such Entry**
  - **No Meter was found for Identifier=<Message Serial Number> and Service Location=<Service Location Name>**

    This occurs when a Meter entity is missing from the static data. The service location give is the one corresponding to the MPRN for which meter data is imported. No valid meter is associated with this service location and the specified meter serial number from the meter data message.
  - **No Service Location found for Identifier=<MPRN>**

    This occurs when a Service Location entity is missing from the static data. Each MPRN should have a corresponding service location. The service location's external identifier should match the MPRN.
  - **No matching 3XX message for NETWORKS_REFERENCE_NUMBER=<Network Ref #>**

    A withdrawal message was imported but refers to a 3XX message that does not exist in the system. This can occur when the messages are imported out of order. The withdrawal message can be re-processed after the corresponding 3XX message is imported, but this is not necessary (it is fine to leave the source 3XX message out of the system – since it is being withdrawn, it would not be used in any downstream processing anyway).
  - **There is no channel named <Register Type Code> belonging to <Meter Name>**

    To import QH/HH meter data (341, 342 messages), a meter channel must be defined for each register type code for a given meter serial number.
- **ORA-20005: Too Many Matching Entries**
  - **More than one matching 3XX message was found for NETWORKS_REFERENCE_NUMBER=<Network Ref #>**

    This generally should not occur. It indicates that more than one distinct 3XX message was imported but with matching network reference numbers. If messages are issued this way from the MRSO/NIE, then a withdrawal cannot be performed since it is ambiguous which message is being withdrawn.

- **ORA-20060: Missing MPRN**
  - **Account not found. MPRN=<MPRN>**

    This error occurs when an Account entity is missing from the static data. Each MPRN should have a corresponding account. The account's external identifier should match the MPRN.
  - **Invalid Account. Account is not a "Meter" modeled. MPRN=<MPRN>**

    This error occurs when the Account entity is incorrectly configured. Its model option must be "Meter".
  - **Account/ESP record not found. MPRN=<MPRN>**

    This error occurs when an Account entity is incorrectly configured. It must have a valid supplier (ESP) assignment for the duration of the incoming meter read (its previous read date through its current read date).
  - **Account/EDC record not found. MPRN=<MPRN>**

    This error occurs when an Account entity is incorrectly configured. It must have a valid distribution company (EDC) assignment for the duration of the incoming meter read (its previous read date through its current read date).
  - **Account Status not found. MPRN=<MPRN>**

    This error occurs when an Account entity is incorrectly configured. It must have a valid status assignment (that indicates the account is active) for the duration of the incoming meter read (its previous read date through its current read date).
  - **Service Location not found. MPRN=<MPRN>**

    This occurs when a Service Location entity is missing from the static data. Each MPRN should have a corresponding service location. The service location's external identifier should match the MPRN.
  - **Account/Service Location not found. MPRN=<MPRN>**

    This occurs when the Account entity is incorrectly configured. The account should be associated with the corresponding service location for the duration of the incoming meter read (its previous read date through its current read date).
- **ORA-20061: Missing Serial Number**
  - **Serial Number not found. SERIAL_NUMBER=<Meter Serial Number>**

    This occurs when a Meter entity is missing from the static data. A meter must exist for each distinct combination of MPRN and Meter Serial Number. The meter should be assigned to the MPRN's corresponding service location and should have an external identifier that matches the specified serial number.
  - **Invalid Meter. Meter Type is not <Expected Type>. SERIAL_NUMBER=<Meter Serial Number>**

    This occurs when the Meter entity is incorrectly configured. The meter's type must be "Period" to import NQH/NHH meter data (300, 305, 306, 307, 310, 320, 332 messages) and must be "Interval" to import QH/HH data (341, 342 messages).
  - **Service Location/Meter not found. SERIAL_NUMBER=<Meter Serial Number>**

    This occurs when the Meter entity is incorrectly configured. The meter must be assigned to the MPRN's corresponding service location for the duration of the incoming meter read (its previous read date through its current read date).

- **The SERIAL_NUMBER in the file contains TIMESLOT_CODEs that belong to more than one TOU Template. SERIAL_NUMBER: <Meter Serial Number>**

  This indicates a potentially malformed file or incorrectly defined TOU templates. *All* time slot codes indicated in a NQH/NHH meter message for KWH unit of measure should correspond to Period entities that are all assigned to the same TOU template. For example, we should not receive a message that indicates both 00D and 24H time slot codes for the same meter serial number. Mixed-site MPRNs should instead have multiple serial numbers – one for the Day/Night metering, another for the 24-Hour metering.

- **SERVICE_ID not found. SERIAL_NUMBER=<Meter Serial Number>**

  This is an internal error. A problem was encountered querying or generating a SERVICE_ID for the specified serial number's metered usage.

- **ORA-20062: Missing NQH Static Data**

  - **Entity Group not found. DUOS_GROUP=<DUoS Group>**

    This error occurs when an Entity Group entity is missing or incorrectly configured. An entity group must exist whose name matches the specified DUoS group and whose category is 'Distribution Group'.

  - **Account/Entity Group not found. DUOS_GROUP=<DUoS Group>**

    This error occurs when an Account entity is incorrectly configured. It must be assigned to the specified entity group for the duration of the incoming meter read (its previous read date through its current read date).

  - **The MPRN's associated Calendar <Calendar Name> does not have the expected profile code (<Message Profile Code>)**

    This error occurs when a Meter or Calendar entity is incorrectly configured. Its load models must include a Calendar assignment to a Calendar entity that corresponds to the specified profile code. The calendar's external identifier should match the profile code.

  - **Meter/Calendar not found**

    This error occurs when a Meter entity is incorrectly configured. Its load models must include a Calendar assignment to a Calendar entity that corresponds to the specified profile code.

  - **Period not found. TIMESLOT_CODE = <Message Time Slot Code>**

    This error occurs when a Period entity is missing. A Period entity must exist whose alias corresponds to the time slot code indicated in the market message.

  - **Template not found. TIMESLOT_CODE = <Message Time Slot Code>**

    This error occurs when a TOU Template entity is missing or incorrectly configured. The Period entity that corresponds to the specified time slot code should be assigned to one and only one TOU Template. This error occurs when the period is not assigned to any template.

  - **Channel <Register Type Code> belonging to meter <Meter Name> does not have the expected op code of <Op Code>**

    This error occurs when a meter channel is incorrectly configured. Its operation code should match the expected operation code. The expected operation code is derived from the register type code – the mapping is stored in the System Dictionary: **Global** > **MarketExchange** > **TDIE** > **RegisterTypeCodeMapping**.

  - **Channel <Register Type Code> belonging to meter <Meter Name> does not have the expected UOM of <UOM>**

    This error occurs when a meter channel is incorrectly configured. Its unit of measurement does not match the unit of measurement indicated in the incoming 341/342 message.

Warnings that can occur during import/processing of meter data:

- **The Period <Message Time Slot Code> is assigned to more than one Template.**

  This occurs when the period that corresponds to the specified time slot code is assigned to more than one template. The import will proceed, and an arbitrary TOU template is chosen (and will be indicated in the warning message). It is recommended that the TOU templates be corrected and the message re-imported.

- **Could not find a matching METER_TOU_USAGE_FACTOR to withdraw**

  A withdrawal message was processed but the corresponding data from the original 3XX message was not found. The METER_TOU_USAGE_FACTOR table is part of the core data model and is how the application imports/processes time-of-use usage factors associated with meters. This could indicate that the meter's usage factors were changed manually after the original 3XX message was imported.

Appendix C: Converting ROI TUoS Spreadsheets to CSV

ROI TUoS backing sheets are provided in Microsoft Excel workbooks. The application requires a CSV (Comma-Separated Values) file, however, to import the backing sheet details.

- Column headers may be retained in the CSV export. The CSV import process will skip the first row as long as the first comma-separated field is "Inv Number".
- Only the following columns must be exported, and they must be exported in the order listed below and (for numbers and dates) using the formats listed below. This should match the existing order and format for these values in the Excel worksheet, but any variances from these orders and formats must be corrected before saving to CSV.
- The backing sheet is parsed based on the number of fields in the first record. If the record has exactly 48 fields it is parsed according to the "Post April 2013" format, otherwise it is parsed according to the "Prior to April 2013" format.

Backing Sheet Format Post April 2013

Column	Column Header	Data Type	Format
A	Inv Number	VARCHAR2(12)	
B	Inv Name	VARCHAR2(64)	
C	Inv Category	VARCHAR2(64)	
D	Inv Type	VARCHAR2(64)	
E	Inv Start Date	DATE	dd-mmm-yyyy
F	Inv End Date	DATE	dd-mmm-yyyy
G	Inv Status	VARCHAR2(64)	
H	Inv Date	DATE	dd-mmm-yyyy
I	Inv Due Date	DATE	dd-mmm-yyyy
J	Customerid	VARCHAR2(64)	
K	Customer Code	VARCHAR2(64)	
L	Customer Name	VARCHAR2(64)	
M	Accountid	NUMBER	
N	Account Type	VARCHAR2(64)	
O	Account Code	VARCHAR2(64)	
P	Account Name	VARCHAR2(64)	
Q	Vmeterid	NUMBER	
R	Vmeter Name	VARCHAR2(128)	
S	Bill Name	VARCHAR2(64)	
T	Bill Contact	VARCHAR2(1000)	
U	Bill Address1	VARCHAR2(1000)	
V	Bill Address2	VARCHAR2(1000)	

Column	Column Header	Data Type	Format
W	Bill City	VARCHAR2(1000)	
X	Bill Region	VARCHAR2(1000)	
Y	Bill Country	VARCHAR2(1000)	
Z	Bill Postal Code	VARCHAR2(64)	
AA	Inv Det Start Date	DATE	dd-mmm-yyyy
AB	Inv Det End Date	DATE	dd-mmm-yyyy
AC	Inv Det Category	VARCHAR2(64)	
AD	Inv Det Type	VARCHAR2(64)	
AE	Inv Det Code	VARCHAR2(64)	
AF	Inv Det Name	VARCHAR2(100)	
AG	Inv Det Value	NUMBER	
AH	Inv Det UOM	VARCHAR2(10)	
AI	MULTI_CIP_FLAG	VARCHAR2(1)	
AJ	Inv_Det_Value_Charges	NUMBER	
AK	Inv_Det_Type_Sort	VARCHAR2(3)	
AL	Inv Det Category2	VARCHAR2(64)	
AM	Eir Rpt Inv Det Id	NUMBER	
AN	Inv Det Seq	NUMBER	
AO	Bill_Date	DATE	dd/mm/yyyy
AP	CIP Date	VARCHAR2(100)	
AQ	Inv_Number_Released	VARCHAR2(12)	
AR	Inv_Date_Released	DATE	dd-mmm-yyyy
AS	Inv Det Note	VARCHAR2(1000)	
AT	Inv_Det_Note_Sort	VARCHAR2(3)	
AU	DLAFG	VARCHAR2(8)	
AV	DG	VARCHAR2(8)	

Backing Sheet Format Prior to April 2013

Column	Column Header	Data Type	Format
A	Inv Number	VARCHAR2(12)	
B	Inv Name	VARCHAR2(64)	
C	Inv Category	VARCHAR2(64)	
D	Inv Type	VARCHAR2(64)	
E	Inv Start Date	DATE	dd-mmm-yy
F	Inv End Date	DATE	dd-mmm-yy
G	Inv Status	VARCHAR2(64)	
H	Inv Date	DATE	dd-mmm-yy
I	Inv Due Date	DATE	dd-mmm-yy
J	Customerid	VARCHAR2(64)	
K	Customer Category	VARCHAR2(64)	
L	Customer Type	VARCHAR2(64)	
M	Customer Code	VARCHAR2(64)	
N	Customer Name	VARCHAR2(64)	
O	Accountid	NUMBER	
P	Account Category	VARCHAR2(64)	
Q	Account Type	VARCHAR2(64)	
R	Account Code	VARCHAR2(64)	
S	Account Name	VARCHAR2(64)	
T	Vmeterid	NUMBER	
U	Vmeter Category	VARCHAR2(64)	
V	Vmeter Type	VARCHAR2(64)	
W	Vmeter Code	VARCHAR2(64)	
X	Vmeter Name	VARCHAR2(64)	
Y	Bill Name	VARCHAR2(64)	
Z	Bill Contact	VARCHAR2(1000)	
AA	Bill Address1	VARCHAR2(1000)	
AB	Bill Address2	VARCHAR2(1000)	
AC	Bill City	VARCHAR2(1000)	
AD	Bill Region	VARCHAR2(1000)	
AE	Bill Country	VARCHAR2(1000)	
AF	Bill Postal Code	VARCHAR2(64)	
AG	Inv Det Start Date	DATE	dd-mmm-yy
AH	Inv Det End Date	DATE	dd-mmm-yy
AI	Inv Det Category	VARCHAR2(64)	
AJ	Inv Det Type	VARCHAR2(64)	

Column	Column Header	Data Type	Format
AK	Inv Det Code	VARCHAR2(64)	
AL	Inv Det Name	VARCHAR2(1000)	
AM	Inv Det Value	NUMBER	
AN	Inv Det Uom	VARCHAR2(10)	
AO	MULTI_CIP_FLAG	VARCHAR2(1)	Y, N
AP	Vat_Charge	NUMBER	
AQ	Inv_Det_Value_Charges	NUMBER	
AR	Inv_Det_Value_Charges_No_VAT	NUMBER	
AS	Inv_Det_Type_Sort	VARCHAR2(3)	
AT	Inv Det Category2	VARCHAR2(64)	
AU	Eir Rpt Inv Det Id	NUMBER	
AV	Inv Det Seq	NUMBER	
AW	Bill_Date	DATE	yyyy-mm
AX	CIP Date	VARCHAR2(64)	
AY	Invoice_Status_Draft	VARCHAR2(100)	
AZ	Inv_Number_Released	VARCHAR2(12)	
BA	Inv_Date_Released	DATE	dd-mmm-yy
BB	Inv Det Note	VARCHAR2(1000)	
BC	Inv_Det_Note_Sort	VARCHAR2(3)	