

Product Overview

Retail Operations Functional Overview



An energy operations management system for retail power and gas marketers and distribution companies

DATA MANAGEMENT:

The Retail Operations Data Management module supports the creation and maintenance of the system and business model data necessary for the operation of all Retail Operations modules. The Data Management module is included with delivery of all Retail Operations modules.

Retail Accounts and Customers

The Retail Operations Data Management module supports the creation and maintenance of Retail Accounts. Retail Accounts represent the end user of power or gas and are the basis for forecasting, meter data management and other retail business processes. The User Interface supports the entry and maintenance of the following properties or relationships.

- User defined Account Status with begin and end dates.
- Multiple fields for capturing names, ids, alias.
- Contact information (name, phone, email)
- Address information
- Sales Representative assignment
- Assignment to one or more Schedule or Account groups
- Assignment to an Energy Distribution Company with begin and end dates, Account Number, Rate Class and Strata
- Assignment to an Energy Service Provider and Pool with Account Number, begin and end dates
- Creation and assignment of one or more Service Locations with begin and end dates.
- Service Locations define additional physical and business information such as Service Point (transmission point or gas city-gate), Weather Station and Meter Reading Service Provider
- Creation and assignment of one or more Meters with begin and end dates, unit of measure, metering interval
- Accounts may be assigned to Contracts. The same Contract may be assigned to multiple accounts. Contracts support begin, end and next action dates.

- Accounts can be modeled at one of the following 3 levels for forecasting and settlement operations.
 1. Meter: Supports tracking meter specific forecasting and meter reporting operations.
 2. Account: A single entity representing the load point with all meters aggregated into a single time series or non-interval read outside Retail Operations.
 3. Aggregate Group: An aggregated group representing multiple customers or service locations with common properties for forecasting and settlement. This option is primarily used for residential and small commercial load aggregation.

Other Business Objects

The Retail Operations EntityManager supports the creation and maintenance of the following common business objects:

- Energy Distribution Company
- Energy Service Provider (retail marketer)
- Meter Reading Service Provider (competitive meter reader)
- Purchasing Selling Entity (wholesale marketer or other scheduling entity)
- Schedule Coordinator
- Pool
- Sales Representative
- Scheduler
- Pipeline
- Service Area, Region and Zone
- Service Point
- Control Area
- OASIS Node
- NERC eTag elements including: Market Path, Market Segment,
- Physical Segment,
- Transmission Path
- Transmission Service Providers
- Weather Stations and Parameters (i.e. temperature, wind speed, etc.). Composite weather stations and composite parameters can be created by combining two or more existing stations or parameters with composite scaling factors.

Contact and Address Information

The EntityManager allows the user to define a universal list of Contacts (name, phone no., eMail address) and Addresses and assign Contacts and Addresses to any business object. Contacts and Addresses are associated by user-defined Categories which designate the contact and address type (invoice, mailing, etc.).

User Defined Attributes

Accounts and other business objects support the creation of user defined attributes. Attributes may be of String, Boolean, Integer or Float type. Attributes support temporal (begin and end dates) values and may be designated as Always Shown to enable the attribute to always be shown to the user for population on all similar object types.

External Identifiers

All objects may be assigned multiple external identifiers to allow the same business object to be identified by different labels when communicating with external systems.

LOAD PROFILING

The Retail Operations Load Profiling module supports the following functionality.

Load Profiles

In Retail Operations the term Load Profile is used to describe the following three data types:

1. Historical Profile: a historical or future projected time series of load data. Daily, hourly, half-hourly and 15 minute intervals are supported.
2. Typical Day: a 24 hour time series that can represent an average or other type of day. The Retail Operations application utilizes system defined calendars for automated selection of the appropriate typical day shape based on season, month, day type, day of week or holiday.
3. Weather Response Function (WRF): a collection of hourly functions that use a constant and up to 5 weather variable coefficients to compute an expected load value.

Load profiles may be imported from a file and stored in the Retail Operations database or generated based on the following functionality. Load profiles are organized into Libraries for selection from the GUI.

Data Editing

The user interface supports the following data edits:

- Search of the data grid to find missing or zero values
- Interpolation to fill missing values
- Copy/paste to fill hours
- Clipping or Filling a selected range to meet a user-specified max and min value range
- Smoothing of data to minimize anomalies and hour to hour variations

Graphing of Historical Data

The following graphs of time series data are supported:

- 3-dimensional
- Bar graph for selected day or day type
- Line graph of selected hour
- 2-dimensional graph showing range of observed values in each hour and the average of all observations
- Histogram
- Load duration curve
- Average, max and min daily shapes for selected data set

Seasons and Day Types

Retail Operations supports the creation of user defined seasons and day-types. Seasons can be seasons of the year (Spring, Summer, Fall, Winter), utility heating or cooling seasons, or months. Day-types can be days of the week (Sunday, Monday ... Saturday) or types of days such as Weekday/Weekend. For holidays: see Load Forecasting

Typical Day and WRF Creation

The user may filter load data by selected seasons and day types to create Typical Day or WRFs for a season and day type. Typical Day profiles for a given data set may be organized into Libraries for subsequent use in Forecasting or Settlement processes.

The load modeling engine creates linear models (Weather Response Functions) with hourly load equations supporting up to 5 independent weather

variables and 5 piece-wise linear segments for each season and day-type. The WRF process provides the following statistical output: MAPE, R Square and T – statistics.

Calendars

Load profiles are organized into Calendars for use in forecasting and settlement operations. Profiles and libraries may be added, subtracted or multiplied in different combinations. Calendars can be assigned at the Account, Meter or Aggregate Group level.

Load Research Meters

Multiple metered time series can be aggregated to create a single time series of data (i.e. load class averages). Meters can be combined with different begin and end dates and with different weighting factors.

Weather Data

The Profiling Module supports the viewing of historical and forecasted weather data in tabular and graphical format.

LOAD AGGREGATION

The Retail Operations Load Aggregation module supports the following functionality.

Load Profiles

The Load Aggregation process utilizes load profiles imported from external sources or created using tools within the Retail Operations Load Profiling module. Daily, hourly, half-hourly and 15 minute intervals are supported.

Calendars

Load profiles are organized into Calendars for use in data aggregation operations. Profiles and libraries may be added, subtracted or multiplied in different combinations. Calendars can be assigned at the Account, Meter or Aggregate Group level.

Load Data Aggregation

The Retail Operations Load Data Aggregation process takes non-interval meter data and calculates

interval results by applying a load profile. The Data Aggregation process supports the following features:

- Non-interval meters are profiled and stored at the interval level defined by their assigned load profiles.
- Load profiles are assigned at the Account, Meter or Aggregate Group level via a Calendar assignment.
- Distribution and Transmission Loss Factors may be assigned at the Account, Meter, Aggregate Group or Distribution Company level.
- Loss Factors may be defined at the 15 minute, 30 minute, hourly or daily interval level.

Load Data Aggregation Results

The standard application views support the following features:

- Tabular and graphical Output
- Storage of aggregation results for use in MarketManager (either fully automated or manually reviewed before transfer)
- Copy of results for pasting to external applications
- Totals and sub-totals by: Energy Distribution Company (EDC), Purchasing Selling Entity (PSE), Point Of Delivery (POD), Energy Service Provider (ESP), Pool or Schedule Group
- Results for two different aggregation dates can be graphed against each other.
- Minimum, Maximum and Average results with Peak or Off Peak subtotals can be reported by Day, Week, Month, Quarter or Year.
- Total losses and meter data with and without losses can be viewed at the EDC, PSE, ESP or Pool level.
- A tree view supports drill down, reporting and graphing at the Account, Meter or Aggregate Account level.
- Comparison of both tabular and graphical results at the following levels: EDC, PSE, ESP, Pool, Account, Meter or Aggregate Group
- Summary views of total Interval meters over a user specified date range including the number of missing or zero reads
- Summary views of non-interval meter reads including the expected vs. actual number of meter readings by Aggregate Group

LOAD FORECASTING

The Retail Operations Forecasting module supports the following functionality.

Forecast Execution

- Forecasts can be executed for all accounts or for a specified EDC, ESP, Account Group or user selected subset.
- Forecasts can be executed over any user-specified number of days.
- Forecasts can be scheduled for execution at a user-specified time.

Input Data

The forecast engine uses the following input data:

- Enrollment: Begin and end dates for Account and Meter modeled accounts and daily customer counts and scale factors for Aggregate modeled accounts.
- Loss Factors: Loss factors can be assigned at the EDC, account or meter level. Transmission and distribution loss factors are supported. Loss factors are applied as expansion factors following the formula: $(\text{Forecast model} * (1 + \text{DLF})) * (1 + \text{TLF})$. Daily, hourly, half-hourly and 15-minute loss factors are supported.
- Calendar/Profiles: Calendars can be assigned at the Meter, Account or Aggregate level.
- Holiday Schedules: Holiday schedules can be assigned at the EDC level. Holiday specific load models can be used or holidays can be defaulted to use the Sunday load models.
- Weather: Weather data is used for WRF and selected utility data models (PECO, ConEd).
- Scenarios: Scenarios can be created for execution by combining different user defined Cases of Enrollment, Weather, Calendars, Usage and Loss Factors

Forecast Results

The standard application views support the following features:

- Tabular and graphical output
- Copy of forecast results for pasting to external applications
- Totals and sub-totals by: Distribution Company,

- Purchasing Selling Entity, Point Of
- Delivery, Energy Service Provider or Pool
- Results for two different forecast dates can be graphed against each other.
- Minimum, Maximum and Average results with Peak or Off Peak subtotals can be reported by Day, Week, Month, Quarter or Year.
- Total losses and forecasts with and without losses can be viewed at the EDC, PSE, ESP or Pool level.
- A tree view supports drill down, reporting and graphing at the Account, Meter or Aggregate Account level.
- Scenario comparison of both tabular and graphical results at the EDC, PSE, ESP, Pool, Account or Meter level

UFE

Unaccounted For Energy (UFE) is calculated as the difference between the sum of the Account, Meter or Aggregate level forecasts and the total system forecast as imported from an external source. UFE is allocated to all participating accounts on a load ratio share basis. Users may specify which accounts participate in the allocation of UFE.

System and Area Load Reporting

Total forecast or actual load can be imported and stored in Retail Operations at a System or Area Load basis. One or more Areas can be arithmetically combined to create System totals.

Capacity & Peak Load Contribution Reporting

Retail Operations supports the storage of account data such as UCAP, ICAP or Peak Load

Contributions. These values can be stored at the account level and aggregated to report total obligations at the distribution company, energy supplier or pool level.

Financial Forecasts

Financial forecasts are calculated by applying load forecasts to Products representing both the customer revenue and the cost to serve a specific account or aggregation. Products can be assigned at the Account, Meter or Aggregate group level. Products can be comprised of the following standard component types:

- Fixed monthly or daily service fees
- Fixed, monthly or seasonal per unit rates
- Block or Tiered rates
- Market based hourly rates
- Time of Use rates
- Demand rates

Cost and revenue totals can be reported at the EDC, ESP, Account or Product level.

LOAD SETTLEMENT AND BACKCASTING

The Load Settlement module of Retail Operations supports the calculation of Backcasted values and the profiling and aggregation of metered data.

Backcasts

Backcasts are created by applying scale factors and actual weather data to the forecast load models. The system may optionally incorporate any existing meter data into the calculation of the backcast.

Load Profiling and Aggregation

The Retail Operations Usage Allocation process takes non-interval meter data and calculates interval results by applying a load profile. Multiple load profiles can be maintained. Load profiles are assigned at the Account, Meter or Aggregate Group level.

Backcast and Settlement Results

The standard application views support the following features:

- Tabular and graphical Output
- Copy of backcast and settlement results for pasting to external applications
- Totals and sub-totals by: Distribution Company, Purchasing Selling Entity, Point Of Delivery, Energy Service Provider or Pool
- Results for two different backcast or settlement dates can be graphed against each other.
- Minimum, Maximum and Average results with Peak or Off Peak subtotals can be reported by Day, Week, Month, Quarter or Year.
- Total losses and settlements with and without losses can be viewed at the EDC, PSE, ESP or

Pool level.

- A tree view supports drill down, reporting and graphing at the Account, Meter or Aggregate Account level.
- Forecast, Backcast and Settlement comparison of both tabular and graphical results at the following levels: EDC, PSE, ESP, Pool, Account, Meter or Aggregate Group
- Summary views of total Interval meters over a user specified date range including the number of missing or zero reads
- Summary views of non-interval meter reads including the expected vs. actual number of meter readings by Aggregate Group

UFE

Unaccounted For Energy (UFE) is calculated as the difference between the sum of the Account, Meter or Aggregate level meter data and the total system load as imported from an external source. UFE is allocated to all participating accounts on a load ratio share basis. Users may specify which accounts participate in the allocation of UFE.

System and Area Load Reporting

Total forecast or actual load can be imported and stored in Retail Operations at a System or Area Load basis. One or more Areas can be combined added or subtracted to create System totals.

SCHEDULING

The Retail Operations Scheduling module supports the following functionality.

Retail Operations provides a transaction (deal) entry screen to capture wholesale transactions. The following properties can be recorded for each transaction or schedule:

- Transaction Name
- Identifier (manually entered or use system generated unique id)
- Transaction Type (Load, Purchase, Sale, Generation, Pass-Thru, Injection, Withdrawal, etc.)
- Status
- Interval (hourly, sub-hourly, daily, monthly, etc.)

- Begin and End Dates
- Resource (for generation schedules)
- Commodity (user-defined)
- Contract
- Purchaser and Seller
- Schedule Coordinator
- POR and POD
- Source and Sink
- Zones of Receipt and Delivery
- Pool
- Transmission or Transportation Path
- Market Price (for Mark to Market or Imbalances)
- Scheduler
- Product type (e.g. Firm, Non-Firm)
- Agreement type
- Approval type
- Additional User Defined Properties

Volumes and prices may be entered in standard or user-defined wholesale trading blocks (e.g. 5x16, 2x16, etc.) or in hourly or sub-hourly shapes. Hourly and sub-hourly shaped volumes can be entered through copy/paste, fill range or fill to end spreadsheet like operations.

Schedules can be automatically created for aggregated load volumes from the Forecasting and Settlement modules. Schedules can be aggregated by Distribution Company, Service Point, City Gate, Pool, Zone or user defined Schedule Group.

Retail Operations supports multi-phase settlement as well as internal and external (ISO or counterparty) versions of the same schedule. Schedule values can be reported against each other in both tabular and graphical formats to show variances between different settlement states and internal/external values.

Standard Schedule Views

The standard application screens include the following:

- User defined 'Tree' supporting drill down to individual schedules with tabular and graphical output.
- Table of multiple schedules filtered by schedule coordinator, contract, transaction type and commodity.

- Tabular and graphical comparisons of schedule volumes for different settlement types filtered by transaction type, commodity, purchasing-selling entity, POR and POD.
- Position Reports showing net position as well as load, sales, purchases and generation schedules filtered by commodity, purchaser, seller, distribution company, POR/POD Type, POR, POD and Transmission Provider.

Scheduling graphs and tables are integrated allowing the user to click on a point in the graph and have the table data automatically navigate to the selected point.

Load Balancing

Load Balancing screens allow the user to allocate volumes of purchase and generation schedules to specific load or sales schedules. Schedules can be selected by the user or automatically chosen based on least cost subject to schedule volumes or contract limits. Imbalances are priced at a market price associated with the load area.

Schedule Evaluation

Deal Evaluation screens calculate the impact of individual supply options on the overall weighted average costs to serve a selected load schedule.

Transmission and Generation Metering

Multiple hourly and sub-hourly meters can be aggregated to calculate the net metered volumes at one or more delivery points. Delivery points can be aggregated to show the net metered volumes by zone.

Multiple sources can be identified for each meter with the variances between sources shown in both tabular and graphical formats. Multiple values can be maintained for each meter (e.g. forecasted, preliminary, final).

Market Prices

Hourly and sub-hourly market prices can be reported in tabular and graphical formats. Market prices can be exported from external sources via the product API.

QUOTE MANAGEMENT

The Retail Operations Quote Management module supports the following functionality.

Quotes

Retail Operations supports the entry of quotes to prospective customers. Quotes capture the following data elements.

- Customer Name
- Customer Type
- Customer Class
- Status
- Effective Dates (time period that quote is valid)
- Contract Dates
- Marketing Campaign
- Number of Customers (for mass market campaigns)
- Sales Representative
- Distribution Company
- Account Number
- Transmission Service Point
- Weather Station (for forecasting purposes)
- Probability of Signing
- Contacts (name, phone number, email address)
- Addresses

Price Analysis

Financial analysis of quotes include forecasted revenue and costs based on the following inputs:

- **Customer Usage:** Non-interval usage can be entered through the user interface and can include demand and time-of-use volumes. Interval data is supported through the creation of profiles in the Load Profiling module.
- **Profile:** Profiles are used to calculate wholesale purchase volumes from non-interval usage. Profiles may also represent interval metered volumes for an interval metered customer. Profiles are converted to monthly wholesale purchase volumes (e.g. 5x16, 2x16).
- **Loss Factor:** Loss factors are applied in the calculation of the cost to serve the quote.
- **Cost Product:** Products are user defined

combinations of one or more pricing components. Components can represent the purchase price, forward price curve, transmission or ancillary costs, operating expenses, and user defined premiums or margins. Standard product types include hourly price curves (monthly, hourly, sub-hourly, etc.), fixed or seasonal rates, peak demand rates, tiered rates, time-of-use rates or banded imbalance rates.

- **Revenue Product:** The contract revenue can be forecasted based on a margin applied to the cost calculation or from a predefined customer price offering.
- **Comparison Product:** The comparison product allows the calculation of customer savings based on the comparison of the Revenue product to a third party offering or price-to-beat tariff.

Pricing analysis outputs include:

- Monthly, seasonal or total forecasts of energy, peak demand, revenue, cost to serve, margin, comparative product cost and savings.
- A sales price can be calculated by specifying the desired margin over a cost component to get the weighted sales price plus margin over the contract term.

Portfolio Analysis

Multiple Quotes can be combined with existing customers and supply deals into Portfolios. At the portfolio level the user can evaluate the impact of additional quotes or supply transaction on the physical and financial position.

Outputs include graphical analysis of weekday and weekend position curves by month, revenue and costs by month, and projected imbalance volumes and costs based on a forward price curve.

Campaign Reporting

Campaign reports show total energy, revenue, cost and margin by month or for a user defined period of all quotes assigned to a specific campaign.



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