

**User Guide:**

**Resource ID and Recorder Extrac**t

**02/27/2017**

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# Overview

## Background

These extracts were developed due to a desire of Market Participants to have access to EPS (ERCOT Polled Settlement) meter data. During development of the extract, the scope was expanded to include TDSP read Resource ID data and also was expanded to provide ERCOT the capability of sending IDR data to TDSPs that need the data for planning and operations purposes but otherwise would not have access to the data (Recorder Extract Data).

## Document Purpose

This document describes the data contained within the Resource ID (RID) and Non Relational Recorder (REC) extracts, audience for which the information is available, access and delivery information, an explanation on how the report is designed and the tables contained.

The document is intended to provide a business understanding of the data contained and how this data can be applied to the Market Participant.  In addition, this document can also be used as a technical reference for technical readers proficient with relational database programming and administration and basic knowledge of relational modeling as it describes the environment and strategies for data loading. The examples contained in this document use Oracle architecture since ERCOT and many market participants already use this database. The concepts, however, can be applied to any relational database system with adjustments.

When translating the information within this document to your own systems, please be aware that modifications may be needed in order to accommodate your unique environment and thorough testing is strongly advised.

Please note that this document is not intended as a complete guide for scheduled data extracts. Supplemental information regarding individual reports and extracts will be communicated to the market from ERCOT on an as needed basis.

## Applicable Documents, Standards, and Policies

The following Nodal Protocol(s) apply to Resource ID and Recorder Extracts:

Nodal Protocol Section for Recorder Extract (REC) 11.1.10 and 11.1.11

Nodal Protocol Section for Resource ID Extract (RID) 11.1.10 and 11.1.11

# Extract Information

This section covers general information related to the Resource ID and Recorder.

While data extracts are not intended to provide a single solution to resolve all Market Participant needs, they are meant to provide Market Participants with the information about the data sets used by ERCOT to manage and settle the energy market.

## Extract Information

The REC/RID Extracts are daily extracts containing load and/or generation data. The data sets contain information pertinent to the recorder or resource ID read by ERCOT or the TDSP and SCADA data.

## General Extract Information

The REC extract provides data to Market Participants with proprietary and legal entitlement to the data but are not actual owners of the meter point or Resource ID.

The RID extract includes all necessary reference table data and transactional changes pertaining to resource data including Resource ID data, ERCOT Polled Settlement metering information, generation unit telemetry, TDSP read generation, and relationship information.

## Extract Recipients

This extract is intended for Qualified Scheduling Entities (QSEs), Resource Entities (PGCs), Transmission Distribution Service Providers (TDSPs) and Meter Reading Entities (MREs). The RID extract goes to all Market Participants with ownership to the data as defined by access to the data via the ERCOT system and the REC extract goes to Market Participants with a legal right to this data but who are ‘non-owners’ of the data.

# Content

## Content Description

The tables below are included in the extract(s):

| **Table Name** | **Content Description** |
| --- | --- |
| MRE | Meter Reading Entities found in the ERCOT Market |
| PGC | Power Generating Companies that have registered with ERCOT  |
| QSE | Qualified Scheduling Entities that have registered with ERCOT |
| REP | Retail Electric Providers found in the Texas Market |
| TDSP | Transmission and/or Distribution Service Providers in the Texas Market  |
| PGCSERVICEHIST | The historical relationships between PGCs and their associated QSEs |
| GENERATORSITEHIST | The history of the Generator Site Table. A Generator Site is the facility that contains one or more generators. |
| REPSERVICEHIST | Assignment of retail electric providers to scheduling entities over time  |
| RECORDER | The physical devices (i.e. meters) that are set up to receive interval data |
| NOIEHIST | The 8 way characteristics associated with a particular NOIE |
| NOIETIEHIST | Specifies the metering point that includes NOIE ownership, station code and EPS status for a particular point in time.  |
| PGCOWNERSHIP | Specifies the specific percentage amount each owner has in a multi-owned generator site. It also defines the virtual meter point used to store that amount of generation from the one generator. |
| PGCMASTEROWNER | Identifies which PGC is the master owner of a multi-owned gensite and identifies any other owners of a gensite  |
| CHANNEL | Channels associated with recorders. The recorder and associated channel together for the "recorder, channel" ID used when loading interval data from the Lodestar Interval Database. This table is used as a lookup table by the Channel History table. |
| RESOURCEID | Describes meter points read by ERCOT, SCADA feeds, or load points tied to a generation unit that is TDSP read and their settlement characteristics. |
| LSCHANNELCUTHEADER | Header information for the interval data cuts. Records in this table are used by the Channel Cut Data and Channel Cut Edit tables. |
| LSCHANNELCUTDATA | Data values for the interval readings that make up the interval data cuts |

## Timing

The Resource ID and Recorder Extract is a daily extract that posts as a single operating day per extract from 00:00:00 - 23:59:59 for a given operating date. There may be multiple extracts that post per day but each one is specific to an operating date and settlement run. The extracts are available Monday thru Sunday.

## Security Requirements

The Resource ID and Recorder extract is a Certified classification of data available via the MIS and API. In order to access the extract, a Digital Certificate with specific permissions is required. A Digital Certificate must be obtained from your entity’s User Security Administrator. If you are unsure who your company’s USA is, please contact your Account Manager or contact the ERCOT helpdesk for addition information.

# Delivery

(Where the extract resides, posting times, market agreements, etc)

## General Delivery Information

This extract is available on the MIS as well as the API. The extract is available in CSV format and is posted as a zip file. Accordingly, the DDL has been published for this extract. The extract is posted on a daily basis by the end of the day (23:59:59) according to protocol.

As stated above, there will only be one trade day worth of data per operating day. As REC/RID are proprietary extracts, there will be only 1 zip file posted for each run.

Extracts delivered to the market have historically been delivered in .zip packages with .csv file components. If no data change has occurred for a particular table included in the Resource ID and Recorder extracts, the .csv file is not included in the .zip package. At no time is an empty .csv file sent to the market. In addition, if no data change has occurred for all the .csv files within a particular .zip file, a .zip file will not be sent to the market.

## API/Web Services

To programmatically download the information from the API, the user needs to use the reports “report type” ID in order to “Get report” or “Search” for the report on the API. The Resource ID (RID), report type ID = 231 and Recorder extract (REC), report type ID = 232.

## Scheduling an extract

To receive the REC Extract, the Market Participant must go through a legal documentation process with ERCOT and the owner of the meter point in order to obtain authorization to the data. The data provided upon such agreement is the same load data set as provided in the RID Extract.

## Security Requirements

To schedule an extract, Market Participants must access MIS using their digital certificate. Once logged into MIS, Market Participants will need to navigate to the Applications landing page.

From the Applications landing page, in the ERCOT Applications portlet, select ‘Extract Subscriber. Once you have selected ‘Extract Subscriber’, a list of available extracts, based on your entity type/role displays. See Extract Subscriber User Guide or click on the Help button (blue question mark in the top right corner) for additional information.

# Design

## Format of the Extract

The extract is available as a CSV file type.

ERCOT will post the Resource ID and Recorder Extract Data to the ERCOT Market Information System (MIS) every day. All file naming conventions and structures will remain the same.

Market Participants must have access to the ERCOT MIS in order to retrieve their data. If you do not have the appropriate access, please contact your User Security Administrator (USA) or your ERCOT Account Manager.

The Resource ID and Recorder extracts that are posted to the MIS Report Explorer Folder named “Resource ID Extract” and “Recorder Extract” will have the following naming conventions:

* ***CSV ZIP file:***

rpt.000RPTID.000000000000DUNS.yyyymmdd.hhmisssss.filename.zip

Where:

* + - Filename = RID\_Daily or RID\_Initial or REC\_Daily
		- DUNS = DUNs number places padded with leading 0’s to 16 characters
		- RPTID = Report type ID for the report extract posted. The report type id for Recorder Extract is 232 and the report type id for Resource ID Extract is 231.

The files contained in the Resource ID and Recorder extract zip files from the ERCOT MIS will have the following naming conventions:

* The naming convention of the counts files stored within the .zip file is:

 [16-digit DUNS].[EXTRACT\_NAME].COUNTS.csv

 (DUNS number places are padded with leading 0’s)

* The naming convention of the public files stored within the .zip file is:

 [TABLENAME]-DD-MM-YY.csv

* The naming convention of private files stored within the .zip file is:

[16-digit DUNS]-[TABLENAME]-DD-MON-YY.csv

(DUNS number places are padded with leading 0’s)

## DDL

The DDL associated with this report is available on the MIS on the Services page in the public Supporting Information portlet – “Extract Data Definitions”. The DDL name for these extracts is Resource ID. The most current DDL for all reports and extracts will be available in this location. Please note that a Digital Certificate is required to access this area.

## Table Types

### Dimensional Tables

Dimensional table data is provided to all Market Participants. The dimensional data tables are as follows:

* MRE
* PGC
* QSE
* REP
* TDSP

All market participants will receive a Resource ID Extract for data changes to Dimensional Data tables.

### Transactional Tables

Transactional table data is protected data. The transactional data tables are as follows:

* CHANNEL
* GENERATORSITEHIST
* LSCHANNELCUTDATA
* LSCHANNELCUTHEADER
* LSCHANELCUTSTATUS
* NOIEHIST
* NOIETIEHIST
* PGCMASTEROWNER
* PGCOWNERSHIP
* PGCSERVICEHIST
* RECORDER
* REPSERVICEHIST
* RESOURCEID

### RID Tables

Resource ID Level data is only sent to the appropriate market participant data owners based on the relationships in the PGCSERVICEHIST and REPSERVICEHIST tables. The data here generally pertains to both load and generation data. The tables that contain Resource ID Level data are as follows:

* CHANNEL
* GENERATORSITEHIST
* LSCHANNELCUTDATA
* LSCHANNELCUTHEADER
* LSCHANNELCUTHEADERSTATUS
* MRE
* NOIEHIST
* NOIETIEHIST
* PGC
* PGCMASTEROWNER
* PGCOWNERSHIP
* PGCSERVICEHIST
* QSE
* RECORDER
* REP
* REPSERVICEHIST
* TDSP

Market Participants will only receive Resource ID Level tables in their extracts when there are related Resource ID Level data changes within the extract time window.

### REC Tables

Recorder Level data is only sent to the appropriate market participant based on the data sharing agreements made between the Market Participants. These tables commonly contain load data information. The tables that contain Recorder Level data are as follows:

* CHANNEL
* LSCHANNELCUTDATA
* LSCHANNELCUTHEADER
* LSCHANNELCUTHEADERSTATUS
* RECORDER
* RESOURCEID

Market Participants will only receive Recorder Level tables in their extracts when there are related Recorder Level data changes within the extract time window.

# About ERCOT Data Extracts

## Data Extract Elements

ERCOT data extracts provide a framework that allows market participants to retrieve ERCOT market data for analysis. This framework is comprised of two elements: This framework has two key elements:

* DDL/XSDs
* Data Extract Distributions

## Data Definition Language (DDL)

ERCOT provides the structures for Market Participants to load ERCOT data into their own environment in the form of data definition language (DDL). This DDL provides the metadata data for the data type of each field, the table primary and foreign key constraints, and a brief description of the data that is to be loaded into each column.

## Data Extract Format

ERCOT utilizes a standard comma-separated value file format (CSV) for extract data delivery to ensure portability across most platforms and architectures. These CSV’s are distributed to the market through the MIS website packaged in ZIP files.

While data extracts are not intended to provide a single solution to resolve all market participant needs, they are meant to provide Market Participants with the data sets used by ERCOT to manage retail and wholesale operations and to settle wholesale capacity and energy markets.

## Data Definition Language Files

The data delivered to market participants comes from archived ERCOT Lodestar database data. There is a specific methodology which should be followed for importing data. ERCOT makes available a set of metadata data files that contain data definition language (DDL) in Oracle format to create relational tables and constraints (primary and foreign keys). ERCOT makes available a set of metadata data files that contain data definition language (DDL) to create relational tables and constraints (primary and foreign keys) that can store the data being extracted and delivered to market participants. In addition, the DDL also contains database comments to define the expected use of each table and field. While ERCOT provides DDL scripts in Oracle format, there are several CASE tools on the market that can reverse-engineer this DDL file and create new DDL scripts for a broad range of database products. A database administrator should also have the ability to alter the DDL to represent the intended database structures for their particular environment.

The ERCOT provided DDL scripts (posted to the ERCOT MIS on the Services page in the Supporting Information Public portlet – “Extract Data Definitions”) can be executed against an Oracle database instance. The same DDL script can be executed more than once against a database without harming structures that are already in place. Error messages will occur on DDL execution when the structure or constraint is already in place. These messages do not harm the database structures. These messages would include: “table already exists”, “table cannot have more than one primary key” and “foreign key already exists in table.” See Section 6.3, Creating the Database Structure, below for more details.

When there is a change in the requirements of the extract, ERCOT will generate and post a new set of DDL scripts, reflecting the new table structure. When this occurs, ERCOT will send out a market notification and produce both a complete DDL and an incremental DDL. If a market participant has previously created the extract tables in their own database, they should run the incremental DDL to apply the appropriate updates. If a market participant is new to the extract process, they should run the complete DDL. Upon execution of the appropriate DDL file, the extract database schema will be updated to accommodate the extract data in its new format. Although running the complete DDL on your database will not harm your data structures, failure to run an Incremental DDL change on existing databases could leave the database without the required updates. This could cause data loading errors going forward.

The column comments provided within the DDL are to aid the user with the business definitions of field values.

Please note that the DDL does not contain statements which define the physical storage parameters of the individual tables. Storage values will vary greatly by market participant. The DDL also does not contain performance-based indexes. If you have performance issues with your queries, we suggest that you consult with your DBA.

## Creating the Database Structure

When a market participant is setting up a database for an extract for the first time, it is important to determine if your company will benefit more from a single schema/database containing all data retrieved from ERCOT with scheduled extracts or if it is best to generate independent, private schemas/databases for each ERCOT extract. This is not an issue for you if the Resource ID or Recorder Extract or both are the only ERCOT extract(s) that your company uses.

If you decide to create a unified schema, keep in mind that one table can be defined in more than one DDL file. Therefore, running all DDL scripts in a single schema will generate errors indicating previous existence of foreign keys, primary keys and tables. ERCOT recommends the use of a separate schema or database instance for this extract in order to minimize confusion.

ERCOT recommends the creation of two database structures: a staging area and a work area. The staging area should contain only table definitions (no primary or foreign keys) that will be used for staging the data rows being imported. These staging tables would hold data temporarily and will allow for better processing and error tracking. All staging tables MUST be truncated to an empty state after each extract load or prior to the next extract load. The work area will have the tables, primary keys and foreign keys as defined in the DDL.

This is a simplified example for the daily extract loading process using a staging area:

1. Download data extract Zip file from the ERCOT MIS
2. Extract .csv files from Zip file
3. Load all extracted CSV files into staging area
4. For each staging table (in the order found in Appendix A)

iterate through each row:

1. Insert row - if there’s a primary key violation, use INSERT/ELSE UPDATE logic retaining the appropriate record with the greatest add time (i.e. PRIMARY KEY and PIT\_START) in your database

b. Remove row from staging area

In order to implement this process, the market participant will need programmatic support. There are several options for development and implementation: SQL\*Loader, PL/SQL, PERL, Visual Basic, etc. See section 6.5, Loading Scheduled Extract Data, for more information about loading data into DDL structures.

## Applying Changes to the Database Structure

The data extract files are based on a database model expressed by the DDL scripts. Every time there is a change in the underlying data structures, a new DDL script will be released by ERCOT. As mentioned previously, ERCOT produces a complete DDL and an incremental DDL every time a change is necessary.

Following is a list of possible changes to the database and courses of action. This is a general guide, not an all-inclusive list.

### New Table

Create new tables in your database based on your DDL (and staging area, if you have one) and import the data from the extract. Transactional table data will begin appearing on the day the new DDL is scheduled to be implemented. Dimensional data tables (e.g., QSE) will receive a complete load of the records on the go-live date relevant to the market participant. Subsequent data extracts will contain any new or changed records in the ERCOT system for the new table.

### Table Removed

Drop the table from your system. ERCOT will provide detailed instructions, as well as a new DDL, for these types of database changes.

### Column Removed

In Oracle, it is possible to issue an “alter table” command with a “drop column” action. For other databases, perform the appropriate action to achieve the desired result (this may include the creation of a temporary table followed by the re-creation of the table). If the column is part of the primary key, there will be foreign keys on other tables affected by the change. The constraints must be dropped before making the changes (on all affected tables) and recreated afterwards.

### Added Column

In Oracle, a column can be added by issuing an “alter table” command with an “add” option. In most cases the column can be added at the appropriate time and with proper adjustments, the load process will proceed seamlessly. If the new column has been added to the primary key of a table, all child tables will be changed as well. Constraints must be dropped before adding the column and recreated afterwards. If the column is to be included in the primary key there may be special instructions on how to initialize the values for the column (i.e. no nulls).

## Loading Scheduled Extract Data

Once the ZIP file is retrieved from the market participant folder in the ERCOT MIS, it should be expanded into a directory and inspected for completeness. Each individual CSV inside the ZIP file contains data for a single table. The table name and processing date are part of the file name. For tables that are transactional in nature, the market participant DUNS number will also appear in the name of the CSV.

The file format is a standard comma-separated values file. It can be opened using Excel if there is a desire to view the contents on an ad hoc basis. It is important to note that text fields are enclosed in quotation marks (“). The tool used for importing the data (such as Oracle’s SQL\*Loader) should be set up to expect the quotation marks in order to load the data correctly. A comma inside a text field is a valid value so it is necessary to delimit text fields in this manner.

ERCOT recommends using the date embedded in the name of the .csv file for each table to determine load order if you are processing more than one day of extracts at any given time.

**Example: PL/SQL procedure to load table from “staging” area to “work” area**

Following is an example of a SQL\*Loader process to load the QSE table. First, create a working directory and place the CSV file in that directory. Create a SQL\*Loader control file in that directory and call it QSE.CTL. For example:

LOAD DATA

INTO TABLE RESOURCEID

FIELDS TERMINATED BY ',' OPTIONALLY ENCLOSED BY '"'

TRAILING NULLCOLS

(QSECODE VARCHAR2(64),

QSENAME VARCHAR2(64),

STARTTIME DATE "mm/dd/yyyy hh24:mi:ss",

STOPTIME DATE "mm/dd/yyyy hh24:mi:ss",

ADDTIME DATE "mm/dd/yyyy hh24:mi:ss",

DUNSNUMBER VARCHAR2(64),

UIDACCOUNT NUMBER(10),

PIT\_START DATE "mm/dd/yyyy hh24:mi:ss",

PIT\_STOP DATE "mm/dd/yyyy hh24:mi:ss",

OV\_ID INTEGER EXTERNAL)

Please note that the control file lists all columns found in the table definition in the DDL file in the same order. This is very important because SQL\*Loader will use those names and order to place data in the correct columns. After creating the control file, run the SQL\*Loader utility passing the CSV file name (which will change from day to day as the processing date changes) as a parameter:

sqlldr userid=dbuser/dbpassword file=RESOURCEID-03-MAR-03.csv control=RESOURCEID.csv

**Example:** PL/SQL procedure to load table from “staging” area to “work” area

ERCOT recommends the use of staging tables in the process of loading data. Staging tables are temporary tables that have the exact same structure as their production counterparts but none of the restrictions (no primary keys or foreign keys). The staging area allows you to load data into the database tables in any order you want and then process this data routing valid rows to the actual production tables. The procedure below, coded in PL/SQL (language supported by the Oracle database), gives an example of how the transport of data from the staging table into the work table could be implemented:

CREATE OR REPLACE PROCEDURE LOAD\_RESOURCEID IS

BEGIN

 FOR R IN (SELECT \* FROM STAGE\_RESOURCEID) LOOP

 BEGIN

 INSERT INTO RESOURCEID (UIDRESOURCEID,

 RESOURCEID,

 STARTTIME,

 STOPTIME,

 ADDTIME)

 VALUES (R.UIDRESOURCEID,

 R.RESOURCEID,

 R.STARTTIME,

 R.STOPTIME,

 R.ADDTIME);

 EXCEPTION

 # INSERT FAILED. TRY UPDATE <- comment

 WHEN DUP\_VAL\_ON\_INDEX THEN

 UPDATE RESOURCEID

 SET UIDRESOURCEID = UIDRESOURCEID,

 RESOURCEID = RESOURCEID,

 STARTTIME = STARTTIME,

 STOPTIME = STOPTIME,

 ADDTIME = ADDTIME

 WHERE UIDRESOURCEID = R. UIDRESOURCEID;

 END;

 END LOOP;

END;

## Handling Exceptions

#### Foreign Key Error

This means that a table’s row is being loaded before its parent record is loaded causing a foreign key error. To solve this problem, it is necessary to load the CSV’s in the correct order. The loading of the RID/REC DDLs do not add any Foreign Key constraints, so the error will not be produced loading the extracts into these structures. This error would only be generated if referential integrity is enforced through additional Foreign Key constraints

#### Duplicate Primary Key

If a circumstance occurs that causes a duplicate, the row with the greater PIT\_START should be retained, unless a history of all transactions is being kept within the database. The record with the latest PIT\_START will be the most recent version of the record. Anytime a duplicate row is identified and there is no difference in the PIT\_START or PIT\_STOP columns, then one row should be deleted, as these would be redundant.

# Appendices

## Appendix A – Table Order for Daily Loading

RID Extract

Load set one (may run in parallel)

• MRE

• PGC

• QSE

• REP

• TDSP

Load set two (may run in parallel)

• PGCSERVICEHIST

• GENERATORSITEHIST

• REPSERVICEHIST

• RECORDER

Load set three (may run in parallel)

• NOIEHIST

• NOIETIEHIST

• PGCOWNERSHIP

• PGCMASTEROWNER

• CHANNEL

• RESOURCEID

Load set four (in order)

• LSCHANNELCUTHEADER

• LSCHANNELCUTDATA

• LSCHANELCUTSTATUS

REC Extract

(In order)

• RECORDER

• CHANNEL

• RESOURCEID

• LSCHANNELCUTHEADER

• LSCHANNELCUTDATA

• LSCHANELCUTSTATUS

## Appendix B – RID Extract Relationships

### GENSITE Driven RID Relationships

The GENSITE Driven RID relationship is one of 2 RID datasets (the other being NOIE Driven RID) that will be included in the RID extract. The GENSITE Driven RID relationship consists of EPS, SCADA, and TDSP read data. This data is relevant for TDSP, MRE, RE, and QSE entities. It is not relevant for LSE’s.

**DATA OWNERSHIP MODEL:**

RESOURCEID

GENERATORSITEHIST

TDSP

MRE only

PGC

PGCMASTEROWNER

PGCSERVICEHIST

RESOURCE ID

GENERATORSITEHIST

QSE

PGC

GENERATORSITEHIST

PGCSERVICEHIST

RESOURCE ID

PGCOWNERSHIP

QSE

\*Resource id then joins to LSCHANNELCUTHEADER, LSCHANNELCUTDATA, and LSCHANNELCUTSTATUS