

User Guide:

CRR Auction Revenue Distribution (CARD) Extract

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Overview

Background

The CRR Auction Revenue Distribution (CARD) Extract provides Market Participants with data values and calculations used for the monthly CRR Auction Revenue Distribution (CARD) Invoice. The CARD Extract is generated for the prior month’s data and is created monthly each time a CARD Invoice is approved and issued on the 1st Business day following the Real-Time Market (RTM) Initial Settlement posting of the last day of the month on the date specified in the Settlement Calendar.

The CRR Auction Revenue Distribution (CARD) Extract provides necessary data to help ensure that market systems at ERCOT are in sync with Market Participant market systems.

Document Purpose

This document describes the data contained within the CARD Extract, audience for which the information is available, access and delivery information and an explanation on how the extract is designed.

The document is intended to provide a business understanding of the data contained and how this data can be applied to the Market Participant. Any additional information regarding the CARD Extract will be communicated to the market from ERCOT on an as needed basis. Please ensure that these communications are passed within your organization to the appropriate parties responsible for the business and technical aspects of processing CARD Extract data.

When translating the logic within this document to your own systems, please be aware that the examples may need modifications in order to accommodate your unique environment. Thorough testing is strongly advised.

Applicable Documents, Standards, and Policies

### Market Guide and Protocol References

The following Protocol(s) apply to the CARD Extract:

* NP 12.3 (c)

Extract Information

## General Extract Information

Extracts provide Market Participants with data sets in ‘raw‘ table file format from ERCOT markets systems. These files are expected be uploaded into a Market Participants system to be used for shadow settlement. These files differ from reports in that they are not in a consumable format to be read by the user. In order to consume and read these files, this data set along with dimensional tables for defining the information must be uploaded in a database together.

In order to receive extracts from ERCOT with certified data sets, your Entity must first ‘Opt-In’ to the data set in order to receive files. Details on the Extract Subscriber process can be found in a later section.

As with all non-public data from ERCOT, Market Participants must use a digitally authenticated token to obtain access and download files from the Market Information System (MIS) or the External Web Services (EWS) API interface.

Extract data from ERCOT is generally available in two different formats, .CSV and .XML. During the subscription process, you must select one output format. Only Secure data sets (PRDE, MODE, SID) are available in both output types.

If you are not subscribed to the extract, data will not be generated for your entity/DUNS Number. As a general practice, ERCOT is unable to go back and re-run extracts for prior days without affecting the entire market set opted in to the extract so it is important that your entity choose to subscribe to the extract as soon as you are submitting CRR Balancing Account Data.

Once subscribed to the data set, ERCOT will generate data for your entity as it’s available and persisted across the ERCOT systems. If at any point, your entity needs to recover files from ERCOT, this can be achieved with an ad-hoc data request through your ERCOT Account Manager or the ERCOT Helpdesk.

## Extract Recipients

This extract is intended for Qualified Scheduling Entities (QSEs).

Content

## Content Description

## Extract Data Tables

CARD data is only sent to the appropriate Market Participant data owners based on the ownership of the data. There is one table included within the extract:

* AGGOUTPUTHEADER\_CARD
* AGGOUTPUTSCALAR\_CARD
* CRROUTHEADER\_CARD
* CRROUTPUTSCALAR\_CARD

Same data set as in Settlements DDL. Separate DDL is not needed.

## Add times

Data record add times triggered off of CRR\_Balancing\_Invoice.Status = 'A' for INVOICESCHED and Version = Initial.

## Timing

ERCOT will post the CARD Extract Data to the ERCOT Market Information System once the CARD Invoice is approved. The extracts are posted monthly if data is available for the given Market Participant.

Delivery

## General Delivery Information

One zip file will be posted for each extract run and will contain an .xml or .csv file depending on which scheduling option has been chosen.

## API Information

To programmatically download the information from the External Web Services (EWS) API using the GetReport or Search functionality, the user must use the reports “report type” ID. The CARD Extract, report type ID = 11118. Report Type IDs for other ERCOT reports and extracts can be found in the ERCOT Market Information List (EMIL) found on the Services/Market Data Transparency page of the ERCOT Website or the Services Page/Supporting Information Portlet of the MIS. Detailed information on ERCOT EWS including the EIP Internal Interfaces Specifications, the XSD and WSDL can be found on the Services/Market Data Transparency/XSD page on the ERCOT Website.

## Scheduling an extract

In order to receive this extract, Market Participants must be subscribed through the ERCOT Extract Subscriber application.

To schedule an extract, Market Participants must access the Extract Subscriber application available on MIS using their digital certificate. For more details regarding the Extract Subscriber including which extracts can be subscribed, how to unsubscribe or select and modify the output format, please refer to the Extract Subscriber user guide posted on the ERCOT website at <http://www.ercot.com/services/mdt/userguides/index>.

## Security Requirements

The CARD Extract is a private classification of data available on the MIS and API. In order to access the report, a Digital Certificate 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.

Design of Extract

## Format of the Extract

The CARD Extract will be delivered to the Markets tab, Settlements page in the Settlement Statements and Invoices – QSE portlet in the format of a “.zip” with a “csv” or “xml” file included within. The name of the file as it appears in the Market Participant’s Report Explorer Folder named “CRR Auction Revenue Distribution (CARD) Extract” on the MIS will be:

ext. 00011118.000000000000DUNS.yyyymmdd. HHMISSsss.CARD\_CSV OR \_XML.zip

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

000000000000DUNS -Tablename\_CARD.csv or .xml

000000000000DUNS -Tablename\_CARD\_PUBLIC.csv or .xml

## DDL / XSD

The DDL / XSD associated with the CARD Extract are available on both the MIS Services page in the Supporting Information portlet and on ERCOT.com on the ‘Market Data Transparency’ page. The most current DDLs / XSDs for all reports and extracts will be available in these locations. The DDL name for this report is Settlements Extracts DDL. The XSD name for this report is Settlements XSD. See section 6 for more information.

About ERCOT Extracts

## About ERCOT Data Extracts

While data extracts are not intended to provide a single solution to resolve all Market Participant needs, they provide Market Participants with the data sets used by ERCOT to manage and settle the energy market. ERCOT data extracts provide a framework that allows Market Participants to retrieve ERCOT market data for analysis. This framework has two key elements:

* DDL/XSDs
* Data Extract Distributions

**Data Definition Language (DDL) / XML Schema Definition (XSD)**

To enable Market Participants to load ERCOT data into their own environments, ERCOT structures the data in the form of data definition language (DDL) and XML schema definitions. The DDL/XSD provides metadata, including the data type of each field, a brief description of the data that is to be loaded into each column and any table or character/precision constraints or alterations. The DDLs and XSDs are available on both the MIS Services page in the Supporting Information portlet (link name Extract Data Definitions) and on ERCOT.com, on the ‘Market Data Transparency’ page.

**Data Extract Format**

ERCOT utilizes both a standard comma-separated value file format (.CSV) and an Extensible Mark-Up Language (.XML) for extract data delivery. This approach ensures portability across most platforms and architectures. The .CSV and .XML files are packaged in zipped files, and are available to the market through the Market Information System (MIS) website and/or API. Market Participants have the option of choosing either CSV or XML files to receive when scheduling the extract using the Extract Subscriber located on the MIS.

## Data Definition Language and XML Schema Definition Files

The data delivered to Market Participants comes from the ERCOT systems 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 and XML schema definition in XML format to create relational tables and constraints (primary and foreign keys).  The DDL/XSD can store the data extract definitions made available to Market Participants via the MIS. 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 a particular environment.

The DDL and XSD scripts are posted by ERCOT to the MIS and ERCOT.com and 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’ section below for more details.

If a Market Participant is new to the extract process, they should begin by running the complete DDL or XSD.  In the event that a change occurs to the requirements of the extract, ERCOT will generate, distribute and post a new set of DDL and XSD scripts, reflecting the new table structure. If a Market Participant has previously created the extract tables in their own database, they should run the updated DDL or XSD to apply the appropriate updates. Upon execution of the appropriate DDL/XSD file, the extract database schema will be updated to accommodate the extract data in its format. Although running the complete DDL/XSD on your database will not harm your data structures, failure to run any provided incremental DDL/XSD changes on existing databases could leave the database without required data tables and/or fields. This could cause data loading errors going forward.  See Section 6.4 ‘Applying Changes to the Database Structure’ for more information regarding the DDL/XSD change process.

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, then 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.

If you decide to create a unified schema, then keep in mind that one table can be defined in more than one DDL/XSD file. Therefore, running all DDL/XSD scripts in a single schema could 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 also 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/XSD.

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/XML files from Zip file
3. Load all extracted files into staging area
4. For each staging table, iterate through each row:

4a. Insert row - if there is a primary key violation, then use INSERT/ELSE UPDATE logic retaining the appropriate record with the greatest add time (i.e., ADDTIME, LSTIME or TIMESTAMP) in your database

4b. 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 ‘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/XSD scripts. Every time there is a change in the underlying data structures, ERCOT will produce and release a new complete DDL/XSD script to be applied to the Market Participants database.

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/XSD (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/XSD, 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 on the ERCOT MIS, it should be expanded into a directory and inspected for completeness. Each individual CSV or XML 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/XML.

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 file for each table to determine load order if you are processing more than one day of extracts at any given time.

ERCOT recommends truncating the tables before loading the full tables for the day. This is to ensure simplicity in the loading process since not all records included in the daily extract will be new.

### 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 Not Null,

STOPTIME          DATE,

DUNSNUMBER  VARCHAR2(64),

UIDACCOUNT    NUMBER(10),

LS Time             DATE)

## 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.

Issue Reporting and Resolution

Any issues found during the loading process, questions encountered in the data or general handling and access issues can be directed to your ERCOT Account Manager or the ERCOT Helpdesk. All issues received will be resolved in a timely manner. Any changes to the data, the extract or the extract process will be communicated out to the market in accordance with our Market Notice processes.