



SAS[®] Energy Forecasting 3.2: User's Guide, Second Edition

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SAS® Energy Forecasting 3.2: User's Guide, Second Edition

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What's New in SAS Energy Forecasting 3.2

Overview

SAS Energy Forecasting 3.2 includes the following new features:

- Forecasting enhancements
- Input data enhancements
- Report data enhancements
- User interface enhancements
- Batch API

Forecasting Enhancements

- Backcasting

Backcasting, also known as *ex-post forecasting*, is energy forecasting using actual weather data instead of predicted weather data. Backcasting enables you to answer the question, “What energy loads would have been predicted had I known the actual weather?”

For more information, see [Chapter 16, “Backcasting,” on page 87](#).

- Point forecasting

With medium-term/long-term point forecasting, SAS Energy Forecasting uses a single year of typical weather data (which you provide) to produce a single energy load forecast for each hour. With point forecasting, peak load predictions occur on equivalent days in subsequent years as in the first year of predicted energy loads. Point forecasts also take much less time to produce than probabilistic forecasts because only one year of weather data is used for making predictions rather than multiple years.

For more information, see [Chapter 13, “Medium-Term/Long-Term Forecasting,” on page 69](#).

- Reconciliation of a geographical hierarchy

Where energy has been forecast separately for a parent organization/zone and each of its child zones, it is likely that the predicted load for a parent zone does not equal the sum of the predicted loads for its child zones. Reconciliation ensures that the

predicted load for a parent zone is consistent with the predicted loads for all its child zones.

You can run a reconciliation on a short-term forecast, very short-term forecast, or a medium-term/long-term point forecast.

For more information, see [Chapter 17, "Forecasting a Geographical Hierarchy," on page 93](#).

- Performance-optimized forecasts

You can greatly reduce the time required to run a very short-term forecast, without (in general) significantly affecting accuracy, by choosing to bypass some parameter re-estimation that would otherwise occur during the forecast.

For more information, see ["Performance-Optimized Forecast" on page 258](#).

- Export to CSV (comma-separated values)

You can export forecast result tables to a CSV format for use with Microsoft Excel or any other program that accepts CSV.

For more information, see ["Export CSV" on page 107](#).

- Event listening

New parameters for automated, event-triggered forecasting give you greater control over when a new forecast can be initiated automatically. For a very short-term forecast, an event could trigger the next hour that a forecast will run. For a short-term forecast, an event could trigger the next day's forecast. For a medium-term/long-term forecast, an event such as a change to the hierarchy could trigger a new forecast to be run.

For very short-term forecasting, see ["Increment Minute" on page 258](#).

For short-term forecasting, see ["Increment Hour" on page 261](#).

For medium-term/long-term forecasting, see ["Enable Event Listening to Automate Forecasts" on page 263](#).

- Multi-zone forecasting

A multi-zone diagnose significantly reduces the amount of processing time that is required when forecasting a large number of zones. Instead of running a diagnose on every zone, each zone inherits the parameters from a parent node.

For more information, see ["Multi-Zone Diagnose Definitions" on page 18](#).

- Forecast model

You can choose to forecast using a model other than the best model from a diagnose.

- Forecast economic scenario

For a medium-term and long-term forecast, you can choose one or more specific economic scenarios instead of all economic scenarios.

- Delete source data

Each time a forecast is run, SAS Energy Forecasting copies the weather, load, and other required source data specific to the forecast. By default, this source data is saved. You can choose to delete the source data upon completion of the forecast. Deleting the source data reduces the accumulation of data. If needed, the data is available in the source data mart.

Input Data Enhancements

- SAP HANA as input source

In addition to directing forecast results to SAP HANA, you can also use SAP HANA for your input data to SAS Energy Forecasting.

For more information, see [“SAP HANA Database” on page 10](#).

- Input data combined in single files

Instead of providing multiple input files (one for each utility zone), you can provide input tables that contain the merged data for all the utilities in a project.

For more information, see [“Implication of Combining All Data” on page 11](#).

Report Data Enhancements

- Sample reports for SAS Visual Analytics

SAS Energy Forecasting includes sample report data that you can view with the SAS Visual Analytics Report Viewer.

For more information, see [“Sample Reports” on page 112](#).

- More report data

Report output includes more data so that you do not have to do as many calculations to produce a report.

For more information, see [Chapter 20, “Producing Reports,” on page 111](#).

User Interface Enhancements

- Zones view

The **Zones** tab contains the hierarchy of all the zones in the input data.

For more information, see [“Zones Tab” on page 34](#).

- Instances view

The **Instances** tab contains a list of all diagnose, reconciliation, and forecast instances that have been initiated.

For more information, see [“Instances Tab” on page 35](#).

Batch API

- **Functionality**
The batch API that enables you to programmatically accomplish most of the functionality provided by the user interface.
- **Results**
You can view and manage the results of batch actions, such as the creation of projects, diagnoses, and forecasts, in the user interface.
- **Mid-tier database**
Information operated on using the batch API, such as the creation or modification of definitions and instances, is written to the mid-tier database.

For more information, see [Appendix 3, “Batch API,”](#) on page 215.

Part 1

Introduction

Chapter 1

What is SAS Energy Forecasting? 3

Chapter 1

What is SAS Energy Forecasting?

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Why Energy Forecasting?

SAS Energy Forecasting addresses the challenge of electric energy forecasting. SAS Energy Forecasting is built on the experience that SAS has in working with hundreds of utilities worldwide. The solution enables utilities to operate more efficiently and effectively at all levels of decision making, using their existing resources.

SAS Energy Forecasting meets the energy forecasting needs of the entire enterprise by providing accurate forecasts for all departments, such as these:

- Energy Trading
- Marketing
- Risk Management
- Operations
- Fuels
- System Planning
- Finance

SAS Energy Forecasting enables forecast planning horizons ranging from very short-term (for example, an hour ahead) to very long term (for example, 50 years ahead) .

Here is a summary of the importance of energy forecasting to utilities.

Table 1.1 Importance Of Energy Forecasting To Utilities

Very Short-Term	Short-Term	Medium-Term	Long-Term
Owners			
<ul style="list-style-type: none"> • Asset Management • System Operations 	<ul style="list-style-type: none"> • Asset Management • System Operations 	System Planning	System Planning
Departments			
<ul style="list-style-type: none"> • Energy Trading • Unit Commitment • Economic Dispatch 	<ul style="list-style-type: none"> • Asset Management • Unit Commitment • Economic Dispatch • Weekly supply plan 	<ul style="list-style-type: none"> • Budgeting • Outage Planning • Fuel and Power Planning • Capital Rate Making • Revenue Estimation • Business Planning 	<ul style="list-style-type: none"> • Long-Term Financials and Budgets • Integrated Resource Planning • Avoided Unit Rates • Long-Term Outage Planning
Horizon			
1–24 hours	1–14 days	1–4 years	30–50 years
Cycle Time			
Hourly	Daily	1–3 months	Annually
Users			
<ul style="list-style-type: none"> • Energy trading • Generation dispatch • Fuel supply • System operations 	<ul style="list-style-type: none"> • Asset management • Generation dispatch • Fuel supply • System operations 	All organizations	<ul style="list-style-type: none"> • System planning • Finance • Engineering • Rates

Data Analysis

SAS Energy Forecasting analyzes a wide range of data, such as load, weather, economic, calendar, and location. Outliers, holidays, and special events are modeled to improve accuracy over all horizons. You can also define and use additional explanatory variables that you feel might have an impact on specific forecasts.

For short-term and very short-term forecasts, the solution runs through a series of models and selects the best model based on quality parameters set by you. You can choose a model other than the best model.

For medium-term and long-term forecasts, the solution presents a choice of models for you to choose from based on your particular circumstances.

SAS Energy Forecasting recognizes these impacts on electric load:

- hourly temperature
- seasonality across the year
- day of the week
- hour of the day

SAS Energy Forecasting enables you to answer the following types of questions:

- What will be the forecasted load with the forecasted weather information for the next hour, day, week, month, or year?
- What will be the forecasted load and energy for the next 12 calendar months to 50 years under certain combinations of weather and economic scenarios?

You can use the values forecasted by SAS Energy Forecasting in models of economic dispatch, financial management, and resource planning to answer additional questions, such as the following:

- What is the expected revenue for budget planning?
- When should outages be scheduled?
- How much power can be sold or how much needs to be purchased?
- How should we plan fuel contracts?

About This Book

You can access the *SAS Energy Forecasting User's Guide* in two ways:

- Select **Help** ⇒ **User's Guides** ⇒ **SAS Energy Forecasting User's Guide (PDF)**.

This method opens the document that was installed on the middle tier with the SAS Energy Forecasting product. This document might not be the most current version.

- Select **Help** ⇒ **SAS on the Web** ⇒ **SAS Energy Forecasting**.

This method opens a document on support.sas.com. You are ensured of seeing any corrections or additions made to the document after the product was initially shipped.

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Chapter 2

Projects

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Overview

A *project* contains a set of diagnose definitions, forecast definitions, reconciliation definitions, and the results of a forecast. It also contains the results of running forecasts with those definitions.

Before you can create a diagnose definition or a forecast definition, you must create a project to hold them. You can create multiple projects.

TIP Carefully consider how to structure your projects. For example, a project might contain just day-ahead forecasts for each geographic area of an ISO or utility. Also, if you plan to use hierarchical reconciliation, then all the forecasts for your hierarchy must be contained within a single project. Diagnose definitions, forecast definitions, diagnose results, and forecast results are stored in a structure below the project.

See Also

- [“Create a Project” on page 27](#)
- [Chapter 3, “Diagnose Definitions,” on page 15](#)
- [Chapter 4, “Forecast Definitions,” on page 19](#)

Input Data Source

Overview

The data source for a project can be either SAS data sets or an SAP HANA database.

See Also

[Step 3 on page 27](#)

SAS Data Sets

If you choose to use SAS data sets, you must specify the input path. The input path is the complete path to where input data for the project is located.

See Also

[“Input Path for SAS Input Data Source” on page 11](#)

SAP HANA Database

If you choose to use an SAP HANA database, you must specify these items:

- HANA server
The computer that hosts the SAP HANA database. For more information, see [“Configure SAS Metadata Server” on page 188](#).
- HANA instance
The instance of the SAP HANA database.
- HANA schema
The schema for the SAP HANA database that describes the SAP HANA tables to create by SAS Energy Forecasting.
For more information, see [“Create an SAP HANA Schema” on page 190](#).
- HANA authentication domain
The SAP HANA authentication domain.

See Also

[Chapter 28, “Work with SAP HANA,” on page 187](#)

Data Folders

Overview

Here are the data folders that SAS Energy Forecasting uses to store the data for a project:

- [“Input Path for SAS Input Data Source” on page 11](#)

- [“Project Data Path” on page 12](#)
- [“Report Data” on page 154](#)

Input Path for SAS Input Data Source

Overview

When you create a project with SAS as the source of the data, you specify the location for all of the project’s input data. For more information, see [“Input Data Source” on page 10](#).

The location is one of these options:

- A single folder that contains all of the input data for all the utility zones in the project.

Using a single folder is referred to as combining all data. For more information, see [“Implication of Combining All Data” on page 11](#).

- A folder with multiple subfolders.

Multiple subfolders contain the input data. Each subfolder contains the input data for one utility zone in the project. There must be a subfolder for each utility zone in the project.

Note: Your organization might create a folder for each user’s work. Ensure that you save your work in the correct folder.

The input data consists of various tables created by a system administrator.

Implication of Combining All Data

If you choose to combine all data into a single folder, these tables must contain data for all the utility zones in the project:

- Economic table
- Load table
- Typical weather year table
- User-defined data table
- Weather data table

For example, the load table must contain data for all the zones in the project, instead of containing load data for just one zone.

By contrast, these tables are the same whether you combine all data or not:

- Calendar table
- Utility table
- Utility/weather crossing table
- Weather station table

They are the same because they do not contain data for multiple locations.

Project Data Path

Overview

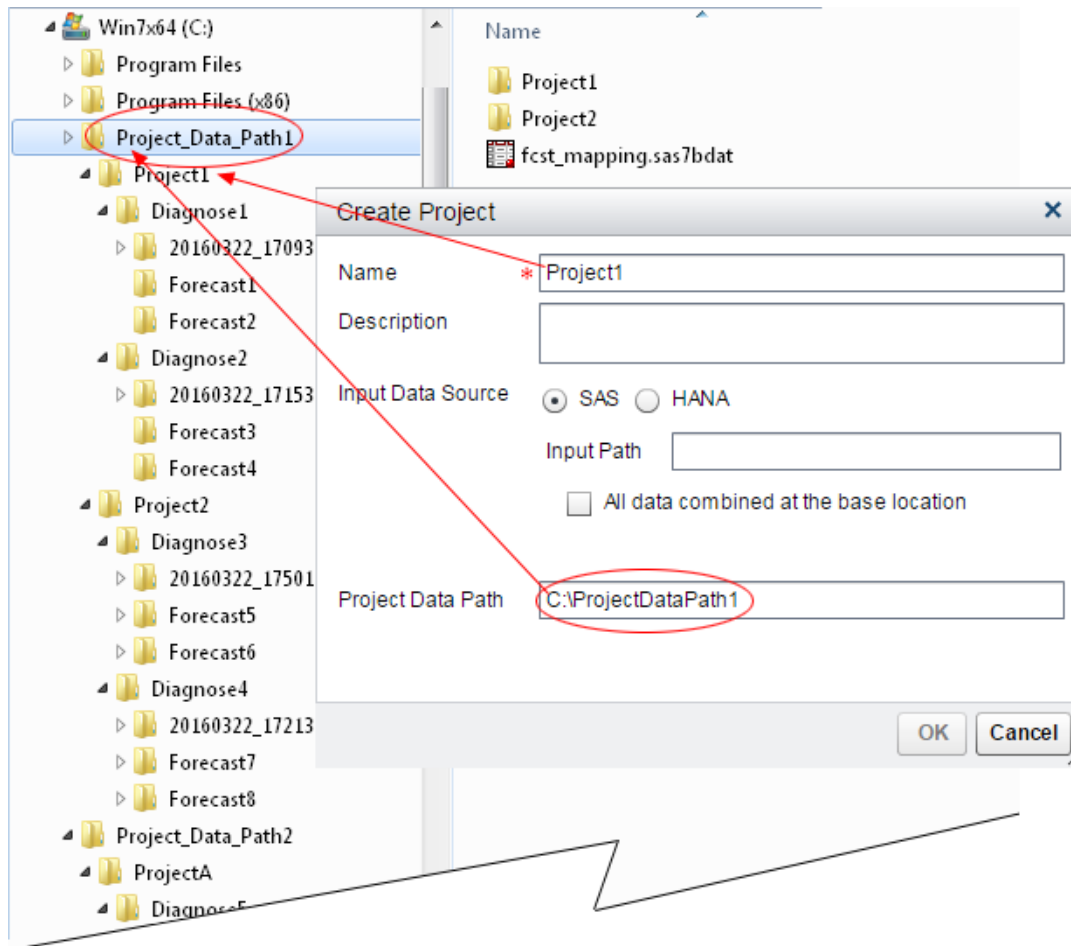
When you create a project, you specify the base location to store project data. In the base location, SAS Energy Forecasting automatically creates a folder with the same name as the project. This folder contains all the information related to the project.

One base location can contain multiple projects. If you specify the same base location each time you create a new project, the new project is created under the base location.

Note: Your organization might create a folder for each user's work. Ensure that you save your work in the correct folder.

Figure 2.1 on page 12 shows the base location `C:\ProjectDataPath1`. This folder is created (if it does not already exist) when a new project is created with this base location specified. You can see that the base location contains two projects: Project1 and Project2.

Figure 2.1 Project Base Location



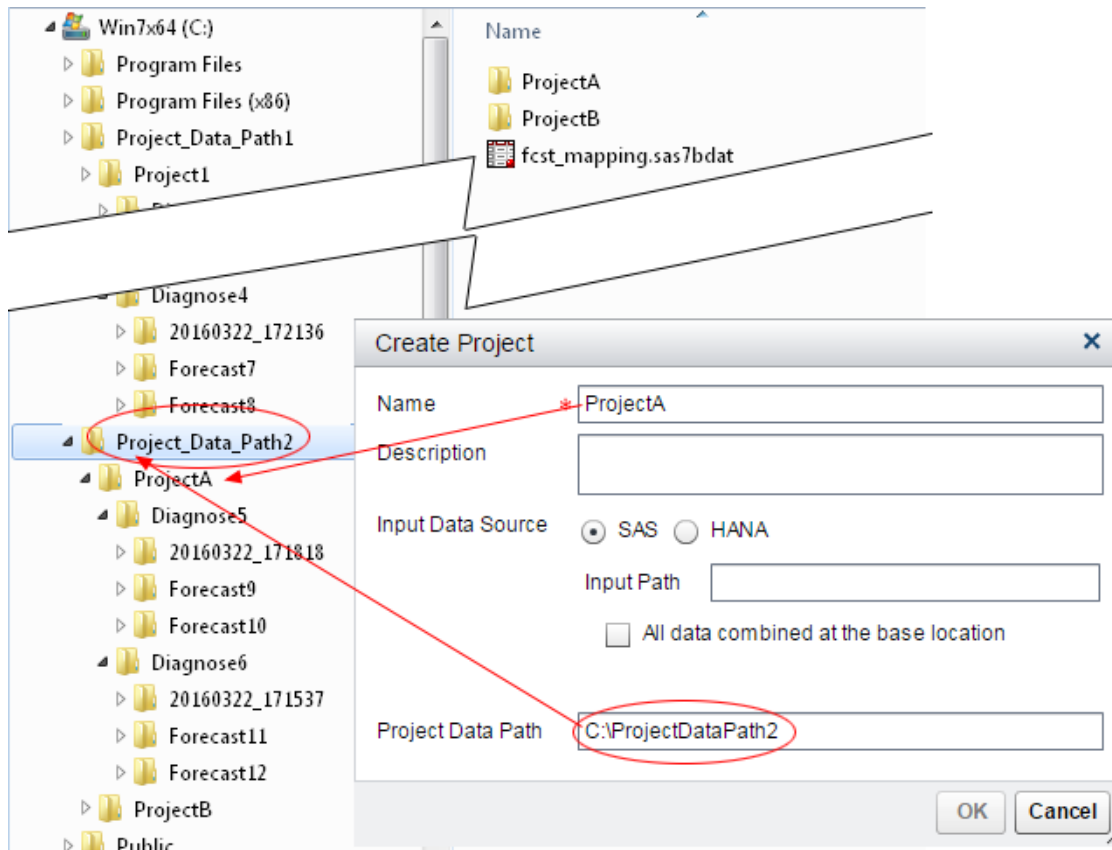
Note: Ensure that every user ID associated with SAS Energy Forecasting Server User has Read/Write/Delete permission to the project data path.

Multiple Base Locations

You can specify multiple base locations, each one containing one or more projects.

Figure 2.2 on page 13 shows a second base location: `C:\ProjectDataPath2`. This folder is created (if it does not already exist) when a new project is created with this base location specified. This base location contains two projects: ProjectA and ProjectB.

Figure 2.2 Second Project Base Location



FCST_MAPPING

The base location contains a file named `FCST_MAPPING`. This file lists, for every project in the base location, the forecasts belonging to that project and the name of the forecast's diagnose. For more information, see [“Accessing a List of Forecasts”](#) on page 83.

Chapter 3

Diagnose Definitions

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Overview

A *diagnose* is a process that uses historical load data and temperature data to analyze various multiple linear-regression models to determine which model is the best fit to forecast future demand and energy. A *diagnose definition* is the specific set of parameters that a diagnose uses during the process.

Although a diagnose definition can be used for several forecasts, it is expected that there will be a separate diagnose definition for each type of forecast: very short-term, short-term, medium-term, or long-term. This allows the parameters to be customized for the specific forecast period.

For very short-term and short-term forecasting, the best fit model selected in the diagnose process is used in the forecasting process by default. You can choose a different model.

For medium-term and long-term forecasting, all models analyzed by the diagnose process are used in the forecast process. To select the final model for forecasting future demand and energy, you analyze the results of the forecast process.

See Also

- [“Create or Edit a Diagnose Definition” on page 28](#)
- [“Run the Diagnose” on page 29](#)
- [“Diagnose Definition Folder” on page 152](#)
- [“Diagnose Instance Folder” on page 153](#)

One-Stage Models and Two-Stage Models

When analyzing models during the diagnose process, results can be determined by either a one-stage model or a two-stage model.

In a one-stage model, the residual values (the difference between the actual value and the forecast value) are assumed to be uncorrelated.

A more advanced modeling technique uses the residual values to determine whether a correlation exists. If a correlation exists, the residual values are used in a second stage of modeling.

For very short-term and short-term forecasting, a two-stage model can produce better results. However, the run duration time is much longer.

For medium-term and long-term forecasting, the two-stage model has not typically shown much improvement in model performance. And, the run duration times are much longer.

Diagnose Definition Parameters

Period Parameters

Period parameters specify the training period, and the start and end dates for the holdout period.

The *training period* is the time between the training start date and the holdout start date. This period of historical data is used to train the diagnose model.

The start date must be equal to or later than the latest start date of the utility's historical load, weather, and other data (the total input of historical data that is available).

Note: You must have at least one year of data for model training to produce diagnose models for a complete year. Two years of data produce diagnose models which better reflect seasonality, and three years is better. Longer training periods might be needed for long term forecasts.

The *holdout period* is used to assess the statistics of the models. Data in this period is held out to validate the tentative forecast. By comparing the results of a particular model with the actual load data in the holdout period (which data is not used in creating the diagnose model), the system calculates a MAPE that is used to select the best model.

The holdout period should be representative of the horizon of the forecast. The holdout period for short- and very short-term forecasts should be at least as long as the horizon of the forecast. A medium- to long-term forecast might require a holdout period of one to three years, depending on the length of data available and the variability of loads over time.

See Also

[“Main Parameters: Periods” on page 251](#)

Weight Parameters

Weight parameters specify how to exponentially smooth the temperature variable in the Recency effect step of the diagnose model selection process. You specify the number of weights to use in calculating the exponential smoothing, the upper boundary for smoothing, and the lower boundary for smoothing.

See Also

[“Main Parameters: Weights” on page 252](#)

MAPE Parameters

MAPE (mean absolute percentage error) parameters specify the type of quality measure that is used to choose the best model. If a weighted MAPE is chosen, you assign weights to several quality measures to create a weighted measure. The total of the weights must be 1.

The best model is determined by comparing the forecast results of a model with the actual load data in the holdout period (the period between the **Holdout Start Date** and the **Holdout End Date**). The load data in the holdout period is not used in creating the diagnose model.

The resulting ranking is shown in the table FCST_STAT, and the top-ranked model according to this criterion is selected as the best model for short-term or very short-term forecasting.

See Also

- [“MAPE Parameters: Type” on page 253](#)
- [“MAPE Parameters: Weights” on page 253](#)

Advanced Parameters

Advanced parameters specify advanced settings.

See Also

[“Advanced Parameters” on page 254](#)

System Parameters

System parameters specify parameters pertaining to the system configuration and define exits that are user-defined routines that can be run before or after the diagnose.

See Also

[“System Parameters” on page 257](#)

Multi-Zone Diagnose Definitions

A diagnose definition applies to a single zone. For a parent zone with numerous children zones, the time to run multiple children diagnoses can be significant. A *multi-zone diagnose definition* enables you to run a single diagnose for the parent zone and all of the children zones at one time. The children zones inherit the parameters from the parent zone.

See Also

- [“Multi-Zone Forecast Definitions” on page 21](#)
- [“Create or Edit a Multi-Zone Diagnose Definition” on page 95](#)

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Forecast Definitions

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Overview

A *forecast* is a process that uses the modeling results from the diagnose process to forecast future demand and energy based on a specific set of parameters. A *forecast definition* is the specific set of parameters that the forecast uses to run.

See Also

- [“Create or Edit a Forecast Definition” on page 29](#)
- [“Run the Forecast” on page 30](#)
- [Chapter 14, “General Forecasting Process,” on page 79](#)
- [“Forecast Definition Folder” on page 153](#)
- [“Forecast Instance Folder” on page 153](#)

Forecast Definition Parameters

Main Parameters

Automate Running a Forecast

For a very short-term or short-term forecast, you can choose to automatically run the forecast whenever new data becomes available. The SAS Energy Forecasting client listens to events on the server. The forecast is run when the %SEFDATAE macro is

invoked on the data tier to signal the SAS Energy Forecasting client that new data is available. For more information, see [Appendix 2, “Run an Event-Triggered Forecast,” on page 211](#).

Optimize the Performance of a Very Short-Term Forecast

For a very short-term forecast, you can choose to optimize the performance by bypassing some parameter re-estimation.

This option significantly reduces the time required to produce a very short-term forecast without (in general) significantly affecting its accuracy.

The very short-term load forecast implements a rolling forecast. A rolling forecast is one in which the forecasted values from a single time period, for example, an hour or a day, are used in subsequent forecasts for the next time period and the oldest time period is dropped. So the forecast “rolls” forward in time and each forecast covers the same amount of time. This allows the forecaster to monitor changing conditions as forecasted values turn into actual values.

When a very short-term forecast is running in normal, non-optimized mode, each separate forecast for every individual time period estimates its regression parameters because the data going into the forecast varies. This produces highly accurate forecasts at the expense of increased execution time, since the parameter estimation process adds additional CPU time that is multiplied by the number of time periods that are being forecasted.

When a very short-term forecast is running in performance optimized mode, a single forecast is run at the beginning and the parameter estimates are captured for that forecast as scoring code. That scoring code is then applied to all subsequent rolling forecasts, which means that those forecasts use the parameter estimates from that initial forecast. This greatly improves execution and CPU time since parameter estimation is bypassed. However, it can result in slightly less accurate forecasts.

In general, when accuracy is important, turn off performance optimization. Otherwise, leave performance optimization turned on to greatly reduce job run times. Internal testing at SAS Institute has shown a 70-90% improvement in execution times using performance optimization with minimal change in MAPEs. The forecaster should test with a variety of their own data to see which method works the best for their business.

Forecast Type

For a medium/long-term forecast, you can do two types forecasting:

- Probabilistic

With probabilistic forecasting, multiple days of historical weather data are used with a probability function to produce a single day’s energy load prediction. For more information, see [“Probabilistic Forecasting” on page 70](#).
- Point

With point forecasting, a single day of typical weather data is used to produce a single day’s energy load prediction. For more information, see [“Point Forecasting” on page 72](#).

Historical Temperature

Mid-term and long-term forecasts do not require an input of forecasted temperature. They are intended to use multiple years of historical temperatures (as defined by the historical temperature start and end dates) to create a probabilistic load forecast.

For example, if 30 years of temperature data are included in the historical temperature start date and the historical temperature end date period, then SAS Energy Forecasting automatically creates 30 forecasts for each hour. The median load value is selected as the forecasted load. The data is available for creating additional forecasts such as at a 90% confidence level or at a 10% confidence level.

See Also

[Appendix 5, “Parameters,” on page 251](#)

Report Data Parameters

Report data parameters specify the structure of output data for reporting. You can choose to publish the results to a SAS data set or SAP HANA reporting data mart. You can choose not to publish the results. You can also choose to publish the data to a normalized or denormalized data model. For more information, see [Chapter 20, “Producing Reports,” on page 111](#).

System Parameters

System parameters specify exit routines to run at initialization of the forecast or after the forecast.

Typically, you use these routines to allocate resources and connections that you need to run a forecast. When the forecast is complete, these routines free the resources and connections.

Note: These parameters are intended primarily for internal SAS use.

Multi-Zone Forecast Definitions

When you create the forecast definitions for a multi-zone diagnose definition, the parameters of the children zone forecast definitions are inherited from the parent zone. The name of each forecast definition is a prefix that you specify and the name of the zone.

Each forecast definition is a separate definition. For the parent zone forecast definition and each child zone forecast definition, you can forecast using the best model from the diagnose, or you can select a different model. You can modify the parameters as needed without affecting the other forecast definitions.

See Also

- [“Multi-Zone Diagnose Definitions” on page 18](#)
- [“Create Multi-Zone Forecast Definitions” on page 96](#)

Chapter 5

Reconciliation Definitions

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Overview

Where energy has been forecast separately for a parent zone and each of its children zones, it is likely that the predicted load for a parent zone does not equal the sum of the predicted loads for its children zones.

A forecast uses historical load and temperature data to predict the load for the future. The location at which the historical load is measured in the various zones might differ from where the system loads are measured. Some zones might take measurements from customer meters and total them to represent the zone load. Other zones might measure the load at the substations. The system load might be taking measurements on transmission lines that interconnect the various zones.

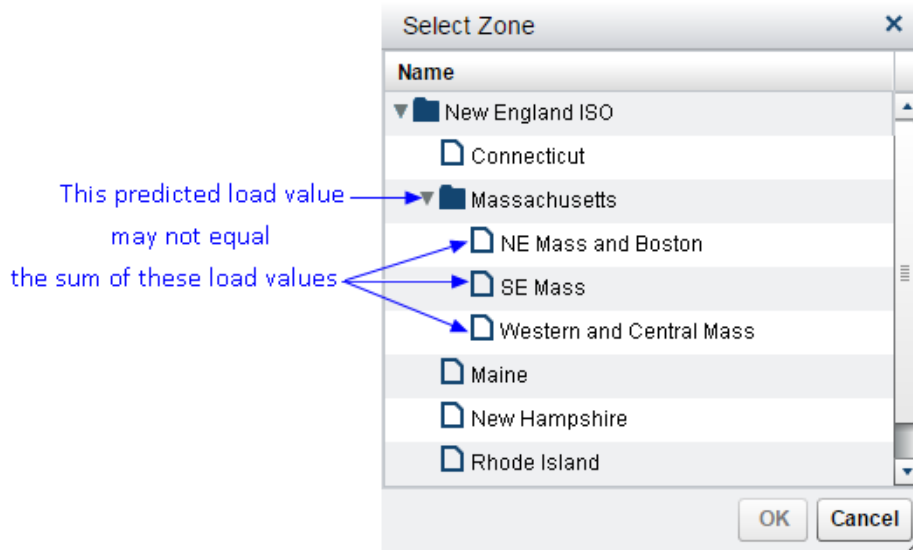
Because these measurements are taken at different locations, they might not account for the losses that naturally occur in transmitting power over the transmission and distribution lines.

A *reconciliation* is a process that ensures that the predicted load for a parent zone is consistent with the predicted loads for all its children zones (that is, is the sum of the predicted loads of the children zones). A *forecast definition* is the specific set of parameters that the reconciliation uses to run.

Note: The forecast horizon (the time span from the forecast start date to the forecast end date) must be the same for all forecast results to reconcile.

For example, if you forecast the energy load for Massachusetts (as shown in this figure), then its predicted load likely does not equal the sum of the predicted loads for its children.

Figure 5.1 Example Massachusetts Hierarchy



When you run a reconciliation on a geographical hierarchy, SAS Energy Forecasting calls the HPFRECONCILE Procedure. For information see “The HPFRECONCILE Procedure” in *SAS[®] Forecast Server Procedures: User’s Guide*, <http://support.sas.com/documentation/onlinedoc/forecast/index.html>.

See Also

- “Create or Edit a Reconciliation Definition” on page 93
- “Run a Reconciliation Definition” on page 94
- “View the Reconciliation Results” on page 95

Reconciliation Definition Parameters

Main Parameters

Reconciliation Method Type

To calculate the reconciliation, you can choose the bottom-up or top-down method.

The bottom-up reconciliation method maintains unchanged the predicted load for lower-level utilities. The predicted load value for the topmost zone are adjusted so as to be consistent with lower-level utilities.

The top-down reconciliation method maintains unchanged the predicted load for the topmost zone. The predicted loads for the lower-level utilities are adjusted so as to be consistent with the topmost.

Disaggregation

If you choose the top-down reconciliation method, you must choose a disaggregation method to control how the aggregation error is apportioned.

The proportions disaggregation method determines the reconciled forecast by proportionally spreading the aggregation error among the lower-level forecasts based on how much each forecast represents in the total sum of the lower-level forecasts.

The difference disaggregation method determines the reconciled forecast by equally splitting the aggregation error among the lower-level forecasts.

System Parameters

System parameters specify exit routines to run at initialization of the reconciliation or after the reconciliation.

Typically, you use these routines to allocate resources and connections that you need to run a reconciliation. When the reconciliation is complete, these routines free the resources and connections.

See Also

[“System Parameters” on page 268](#)

Chapter 6

The Forecast Process Step-By-Step


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Overview

Creating and running a forecast involves these steps:

1. “Create a Project” (See page 27.)
2. “Create or Edit a Diagnose Definition” (See page 28.)
3. “Run the Diagnose” (See page 29.)
4. “Create or Edit a Forecast Definition” (See page 29.)
5. “Run the Forecast” (See page 30.)
6. “Produce Reports” (See page 105.)
7. “Scheduling Forecasts” (See page 81.)

Create a Project


1. Click  on the **Projects** tab.
The Create Project window appears.
2. Enter the project name and (optional) description.
3. Do one of the following to specify the **Input Data Source**:

- Select **SAS**, enter the input path, and then choose whether to combine all data.
The input path is the complete path to where input data for the project is located. For more information about combining data, see [“Input Path for SAS Input Data Source”](#) on page 11.
 - Select **HANA**, and enter the **HANA Server**, **HANA Instance**, **HANA Schema**, and **HANA Authentication Domain**.
For more information, see [“SAP HANA Database”](#) on page 10.
4. Enter the **Project Data Path**.
This is the location where the results data are published. For more information, see [“Project Data Path”](#) on page 12 and [“Data Folders”](#) on page 10.
 5. Click **OK**.
The project is created.

See Also

[Chapter 2, “Projects,”](#) on page 9

Create or Edit a Diagnose Definition

1. Click the **Projects** tab.
2. To create a diagnose definition:
 - a. Right-click the project name, and select **New** ⇒ **Diagnose**.
The New Definition window appears.
 - b. Enter the name.
 - c. Click , select the diagnosis/forecasting location from the hierarchy, and click **OK**.
If you are creating a hierarchical reconciliation, then select the topmost node of the hierarchy to reconcile.
 - d. Continue with [Step 4](#).
3. To edit a diagnose definition, right-click the diagnose definition, and select **Edit**.
The Diagnose - Parameters window appears.
For more information, see [“Lock Icon”](#) on page 38.
4. (Optional) Enter the description.
5. Specify the parameters, and then click **Save**.
For more information, see [“Diagnose Definition Parameters”](#) on page 16.

Note: The **System** tab might be hidden. Whether it is visible or not depends on the **Show System Parameters** preference setting. For more information, see [“Overview of SAS Energy Forecasting User Preferences”](#) on page 209.

See Also

- Chapter 3, “Diagnose Definitions,” on page 15
- Appendix 5, “Parameters,” on page 251

Run the Diagnose

On the **Projects** tab, select the diagnose name, right-click, and select **Run**.

For more information, see “[Status Icons](#)” on page 37.

See Also

- “[Diagnose Results](#)” on page 274
- Chapter 11, “[The Diagnose Process](#),” on page 51
- Chapter 18, “[Viewing the Results](#),” on page 99
- “[Identify the Best Model](#)” on page 29

Identify the Best Model

1. On the **Projects** tab, right-click a diagnose instance in the bottom pane, and select **Properties**.
The properties appear.
2. On the left, click **Parameters**.
3. On the right, click the **Advanced** tab, and review the value for **Best Model**.

Create or Edit a Forecast Definition

1. Click the **Projects** tab.
2. To create a forecast definition:
 - a. Right-click a diagnose definition, select **New**, and then select the type of forecast definition to create.
The New Definition window appears.
 - b. Enter the forecast name.
 - c. Continue with [Step 4](#).
3. To edit a forecast definition, right-click the forecast definition, and select **Edit**.
The Parameters window appears.
For more information, see “[Lock Icon](#)” on page 38.

4. (Optional) Enter the description.
5. Specify the parameters, and then click **Save**.

Note: If you want results data to be written to SAP HANA tables when you run a forecast, you must correctly specify the HANA parameters on the **Report Data** tab. A LIBNAME statement must be specified in the **Reporting Exit** field on the **System** tab. The values for the parameters are provided by your system administrator. For more information, see [“Forecast Definition Parameters” on page 19](#).

Note: The parameters that are available depend on the type of forecast and your specifications.

See Also

- Chapter 4, “Forecast Definitions,” on page 19
- Chapter 15, “Working with Forecasts,” on page 83
- “Very Short-Term Forecasting Parameters” on page 258
- “Short-Term Forecasting Parameters” on page 260
- “Medium-Term/Long-Term Forecasting Parameters” on page 263

Run the Forecast

Note: How you specify parameters for a diagnose definition can affect how long it takes to run a forecast. For more information, see [“Diagnose Parameter Selection and Forecast Performance” on page 80](#).

1. On the **Projects** tab, right-click the forecast definition, and select **Run**.
The forecast starts to run. For more information, see [“Status Icons” on page 37](#).
2. Right-click the forecast instance, and select **Open**.
The results are presented.

See Also

- “Very Short-Term Forecasting” on page 60
- “Short-Term Forecasting” on page 65
- Chapter 13, “Medium-Term/Long-Term Forecasting,” on page 69
- Chapter 18, “Viewing the Results,” on page 99
- Appendix 3, “Batch API,” on page 215

Chapter 7

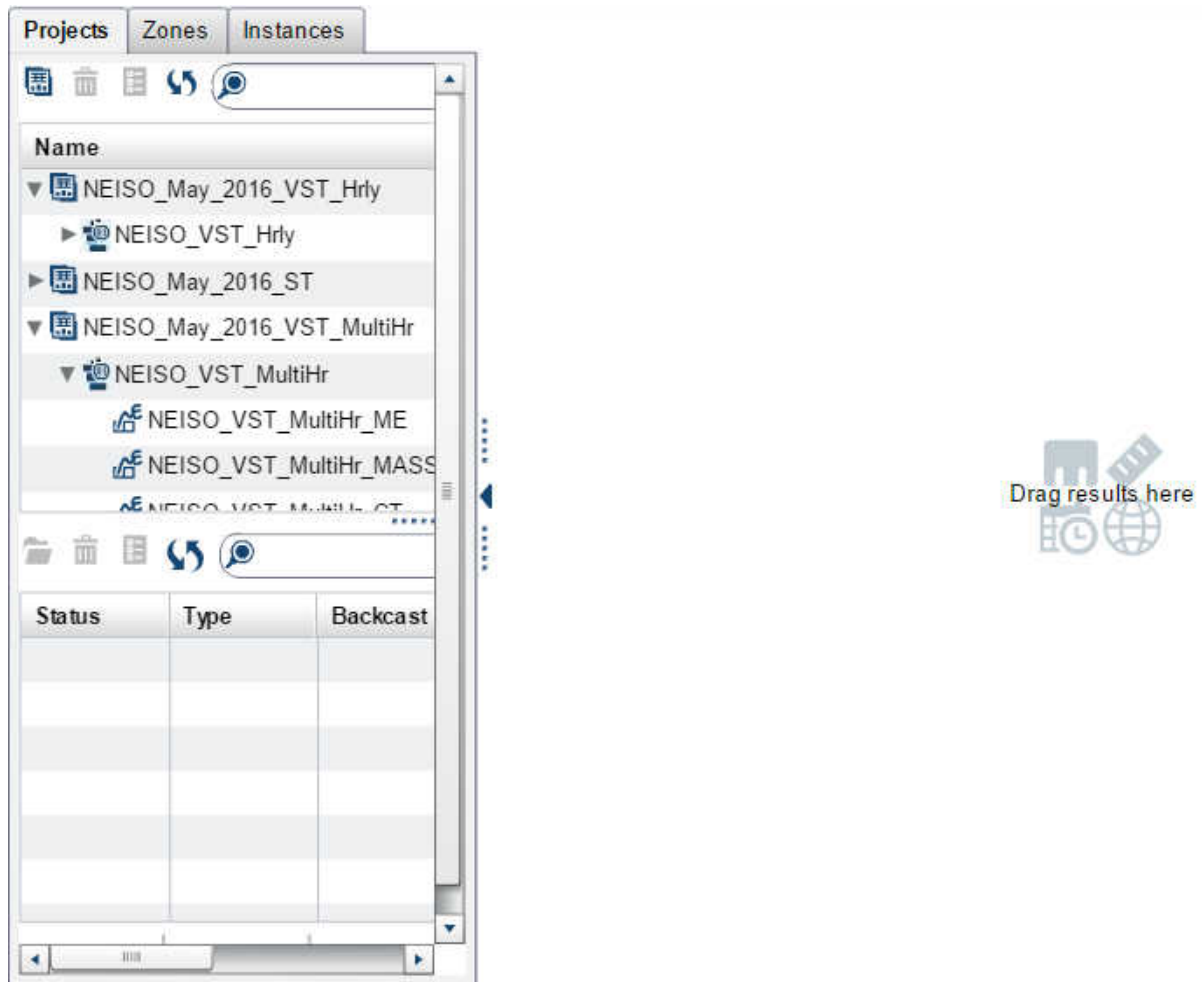
User Interface

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Overview

The user interface is split into two main panes. The left pane contains the **Projects** tab, the **Zones** tab, and the **Instances** tab. The right pane contains the canvas.

Figure 7.1 User Interface



There are other panes, such as the pane at the bottom of the **Projects** tab.

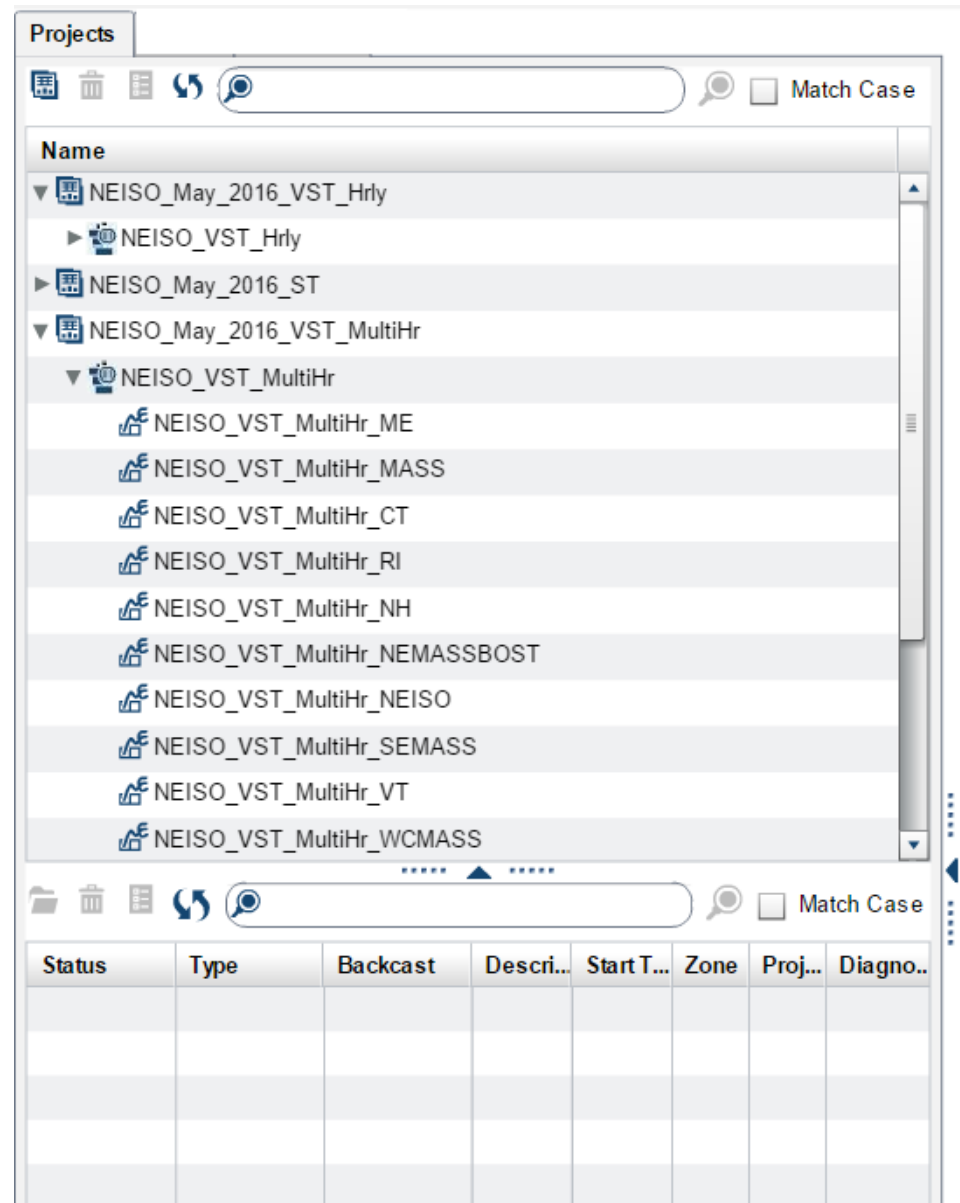
See Also

- “Zones Tab” on page 34
- “Instances Tab” on page 35
- “Canvas” on page 36

Projects Tab

The **Projects** tab contains the projects, diagnose definitions, forecast definitions, reconciliation definitions, and results instances.

Figure 7.2 Projects Tab



When you select a specific zone or drill down into subzones in the top pane, the bottom pane is populated with all of the instances associated with that selection.

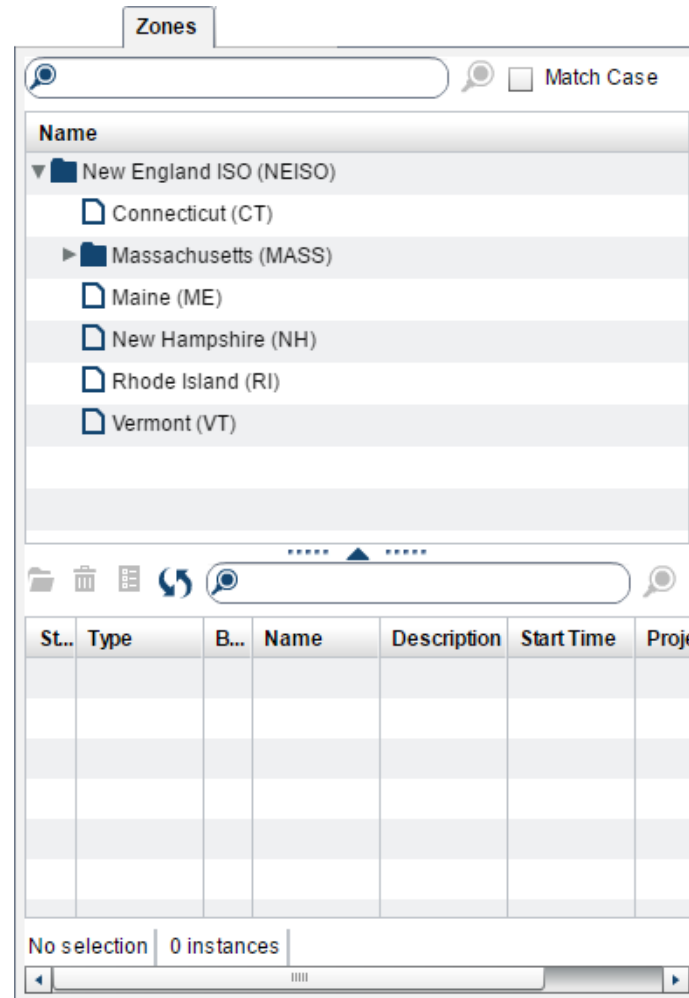
See Also

“Search for an Instance on the Projects, Zones, or Instances Tab” on page 43

Zones Tab

The **Zones** tab contains the hierarchy of all the zones in the input data.

Figure 7.3 Zones Tab



When you select a specific zone or drill down into subzones in the top pane, the bottom pane is populated with all of the instances associated with that selection.

See Also

“Search for an Instance on the Projects, Zones, or Instances Tab” on page 43

Instances Tab

The **Instances** tab contains a list of all diagnose, reconciliation, and forecast instances that have been run.

Figure 7.4 Instances Tab

S.	Type	B.	Name	Descripti..	Start Time	Zone	Proj...
✓	Multi-Zo		NEISO_...	NEISO_...	Tues day...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Tues day...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Monday, ...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Tues day...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Tues day...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Tues day...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Friday, F...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Tues day...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Friday, F...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Friday, F...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Friday, F...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Tues day...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Tues day...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Tues day...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Wednes...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Tues day...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Wednes...	New...	NEI...
✓	Multi-Zo		NEISO_...	NEISO_...	Wednes...	New...	NEI...

877 instances Last refresh: Wednesday, February 22,

The list shows the status of each instance and its association to a project, diagnose, and zone.

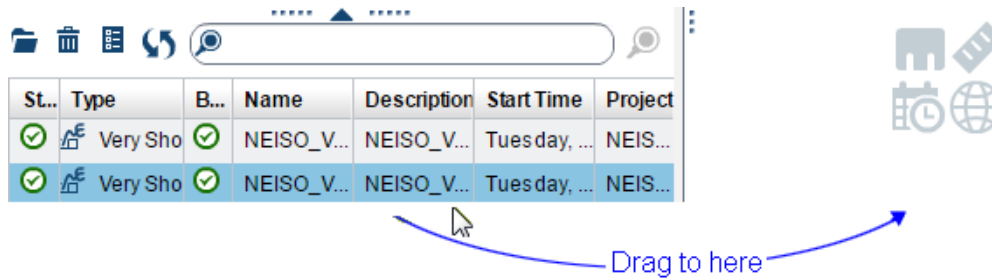
See Also

“Search for an Instance on the Projects, Zones, or Instances Tab” on page 43



Canvas

The canvas is the area in which you view results. You can drag results onto the canvas, double-click a results instance, or right-click a results instance and select **Open**.

Figure 7.5 Canvas



Size or Hide Panes

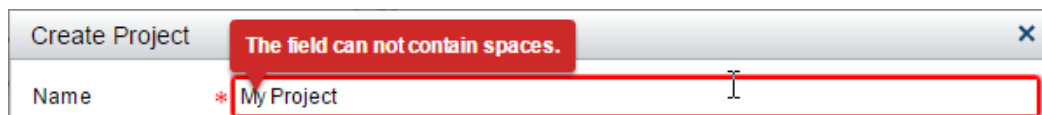
You can size a pane by dragging  or , which are between panes.

You can hide or show a pane by clicking , , , or , which are between panes.

Value Validation

When you specify the value for a field, such as a project name, the value is validated. If the value is invalid, the field turns red. Position the pointer over the field to see a message about the value.










Figure 7.6 Field Validation



Object Icons

Here are the icons that represent objects:


Table 7.1 *Icons That Represent Objects*


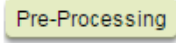

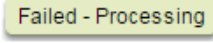

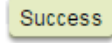
Icon	Description
	Project
	Diagnose definition
	Multi-zone diagnose definition
	Multi-zone run status
	Very short-term forecast definition
	Short-term forecast definition
	Medium-term/long-term forecast definition
	Reconciliation definition
	Error indicator

Status Icons

Status icons indicate the status of a diagnose, forecast, or reconciliation. Here are the status icons:

Table 7.2 *Status Icons*

Status Icon	Description
	Waiting. Another process is running.

Status Icon	Description
 	<p>Processing. A job has started.</p>
 	<p>Failed. A job failed to complete. To determine the cause of the failure, see the error messages.</p> <p>For more information, see “Display the Properties of an Object” on page 44.</p>
 	<p>Success</p> <p><i>Note:</i> The success status of a multi-zone run status means that all of the multi-zone forecasts have completed. It does not mean that the forecasts were successful. To determine the status of the forecasts, review the forecasts on the Zones or Instances tab.</p>

Lock Icon

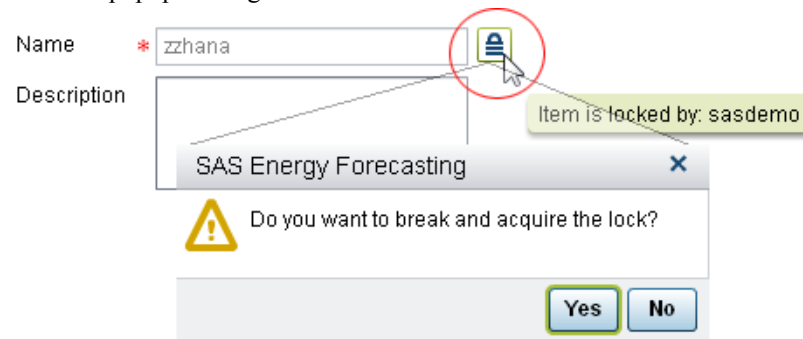
When a diagnose definition or forecast definition is edited, the user editing the definition automatically acquires a lock on the definition, so that other users cannot edit the definition.

The open lock icon appears next to the name of the definition.



Note: The lock remains in effect only as long as the definition is being edited. When the definition is closed, either by saving or discarding any changes that were made, the lock is automatically released.

If another user tries to edit the definition while it is locked, the user sees a closed lock icon and a popup message warns the user that the definition is in use.



The second user can break the lock and acquire it by clicking the lock icon.

If the first user tries to save changes to the definition when the second user has locked the file, the first user sees an error message that the changes cannot be saved because the first user is not the lock owner.

To save the changes, the second user can relock the file by clicking the lock icon.

Chapter 8

Alerts

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Overview

A forecast or diagnose can take a significant amount of time to complete. You can receive an alert by email to notify you of the status of the forecast or diagnose.

To receive alert email, you must register in both SAS Energy Forecasting and SAS Management Console.

Note: To register in SAS Management Console, contact your SAS Energy Forecasting administrator. Only an administrator can register you in SAS Management Console.

See Also

[“Manage Alerts in SAS Energy Forecasting” on page 42](#)

Alert Process

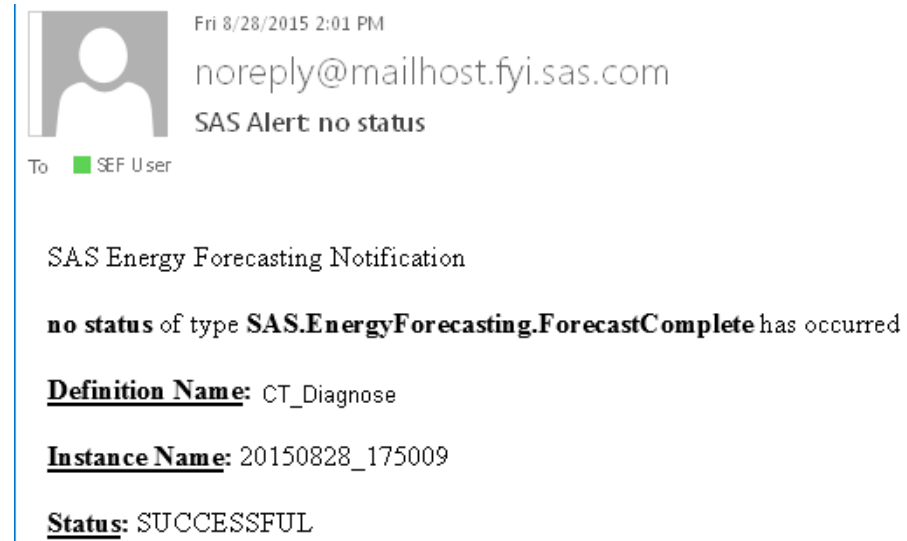
When a diagnose or forecast event occurs for which you are registered to receive an email, two things happen:

1. An alert notification records the fact that an email has been sent.

Note: Deleting an alert notification does not delete the email.

2. An email is sent to the registered address.

Here is a sample email:



Manage Alerts in SAS Energy Forecasting

1. Select **File** ⇒ **Manage Alerts** ⇒ **Manage Alert Registrations**.
The Manage Alert Registrations window appears.
2. Click **+**.
The Create New Alert window appears.
3. Enter the name of the alert, and then select the type of alert.
The name appears in the body of the email that is sent.
4. Select a diagnose definition or forecast definition.
Note: In SAS Energy Forecasting 3.2, forecast reconciliations are treated as a diagnose.
5. Select a status of the definition that will trigger the alert.
TIP If you do not select a status, then an email that indicates the type of event that occurred is sent for any event.
6. Click **OK**.

Chapter 9



Common Tasks

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Refresh Data

On the **Projects** tab, click .


Search for an Instance on the Projects, Zones, or Instances Tab

1. In the field next to , type the text you want to find.
2. To search by case, select **Match Case**.
3. Click .

The next instance that contains the text is selected in the hierarchy. If needed, the hierarchy is expanded.

Note: The search order is alphabetical. So, for instances Project1, Project2, and Project11, the search order is Project1, Project11, and then Project2.

Delete an Object

On the **Projects** tab, select an object, and then click .


You can also right-click an object and select **Delete**.

Cancel an Object

On the **Projects** tab, select an object in the bottom pane, right-click, and then select **Cancel**.

Note: When you cancel a multi-zone forecast, completed forecast instances associated with the canceled multi-zone forecast are deleted.

Display the Properties of an Object

On the **Projects** tab, select an object, and then click .

You can also right-click an object and select **Properties**.

Note: For a diagnose definition or a forecast definition, you can view status messages in log files that pertain to the results of a run. To view these messages, on the left of the Properties window, click **Messages**. To view log files, ensure that the application setting **Save Archive Logs** has been enabled. For more information, see “[Manage Application Settings](#)” on page 158. However, because logs can consume memory, enable logs temporarily only to resolve a problem.

Part 3

How It Works

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Chapter 10

Overview

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The Big Picture

The process starts with understanding the objectives, the key data elements and parameters that need to be considered, as well as the time horizons to include in the forecasting process. It is also necessary to determine the various hierarchies to use (for example, the regions, their relationships, and the weather stations). This data is normally loaded into a project data path and then transferred into the forecasting engine that runs a diagnose of multiple models and select the best model based on the objectives and quality parameters (for example, MAPE).

The forecaster can view outliers in the forecast and the specific data that might have driven the outliers, so that adjustments can be made. An example of an outlier driven by an event could be a large sporting event such as the Super Bowl or the World Cup or a weather event such as a hurricane or ice storm.

After outliers and events have been accounted for and a final diagnose is run, the solution selects the best fit model in the case of short-term and very short-term forecasts, or allows the user to select the best fit model in the case of medium-term and long-term forecasts. The forecaster then selects the type of forecast they want to run. This could be very short-term (measured in hours), short term (measured in days), medium term (measured in months or years), or long term (measured in years). The forecaster then selects parameters and runs the forecast with the best model or a different model. If desired, the forecaster can reconcile the forecast across a defined geographical hierarchy. Using backcasting and other methods, the forecasted results are continuously assessed to determine the accuracy of the model. As the model's performance begins to drift, the forecaster can rerun the diagnose to adjust parameters and reset the best model.

All of this is accomplished through a simple and easy user interface. Results are presented in graphical and tabular forms and can be shared based on the roles of the user.

Here is a very brief overview of the forecasting process:

Figure 10.1 Forecasting Process

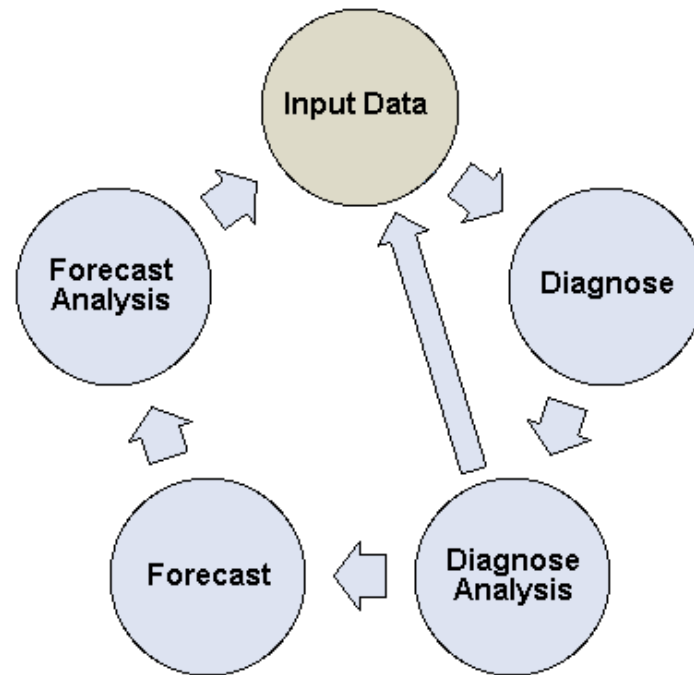


Figure 10.1 on page 48 shows these steps:

1. Input Data
 - Calendar data
 - Historic load data
 - Historic Weather data
 - Economic data
 - User-defined data
2. Diagnose
 - Select the zone (utility segment) of interest.
 - Specify the training and holdout periods appropriate to the forecasting type (very short-term, short-term, medium-term/long-term) for which the diagnose is intended.
 - Select the diagnose parameters to test.
3. Diagnose Analysis
 - View the FCST_STAT data set to compare diagnose model results and resulting MAPEs.
 - Review the OUTLIER tables and determine whether to adjust the source data.
 - Tune the source data and diagnose parameters.
4. Forecast
 - Create a new forecast for the diagnose definition.
 - Specify the forecast horizon.

5. Forecast Analysis

- Scrutinize the forecasted values and results.
- Plan post-processing for implementation.

Chapter 11

The Diagnose Process

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Overview

The diagnose process steps through a set of models to select the best model to use in forecasting with a specific set of data and parameters. You choose the parameters to support the objectives of the forecast.

For example, if the diagnose is intended for a very short-term load forecast, the holdout date parameters are set for a shorter time window than for a medium-term load forecast. The result of the diagnose is a forecasting model that is optimized for the objective and horizon of the forecast.

Diagnose uses the training period data as specified in the diagnose parameters to step through a sequence of possible models. The models are tested against the holdout period defined in the parameters to determine the best models according to the error definition.

Diagnose is a prerequisite process that must be run before any forecasts are developed. The parameters that you specify for a diagnose should be specific to the objective and horizon of the forecast.

Note: It is recommended that you have a separate diagnose for each type of forecast.

See Also

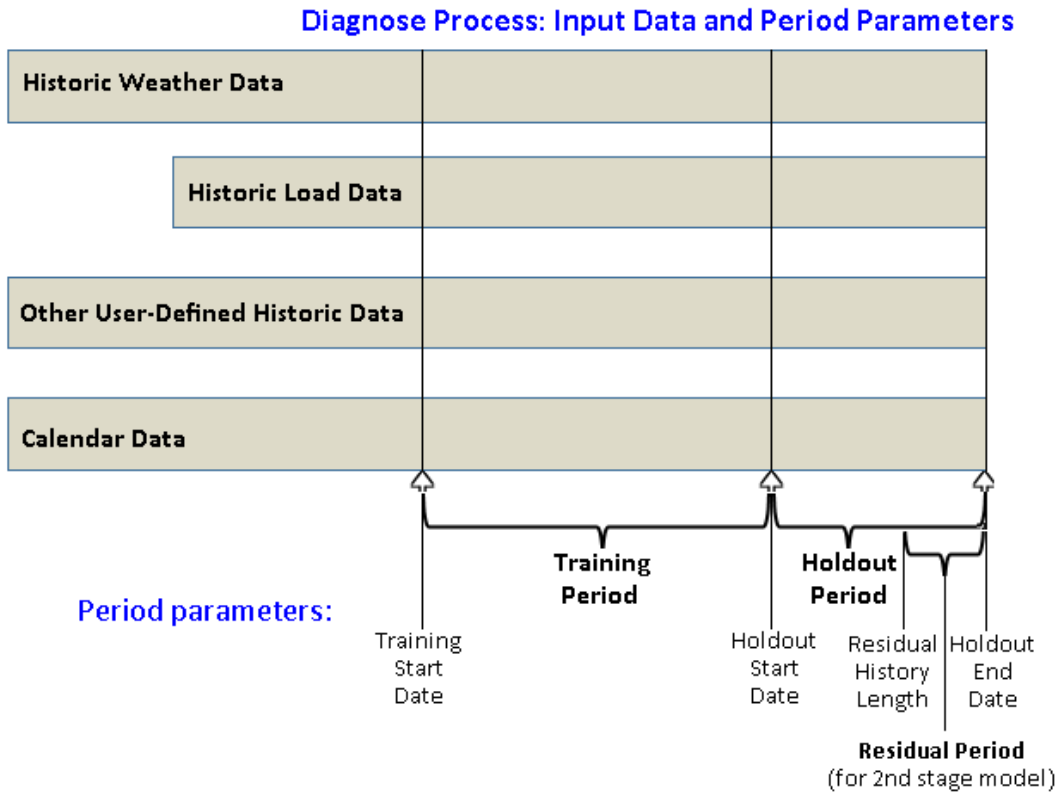
- [“Create or Edit a Diagnose Definition” on page 28](#)
- [Appendix 5, “Parameters,” on page 251](#)
- [“Diagnose Results” on page 274](#)

Data Input and Period Parameters for a Diagnose

Overview

This figure shows the data input and the period parameters for the diagnose process.

Figure 11.1 Data Input and Period Parameters for Diagnose Process



Data Input

“Data Input and Period Parameters for a Diagnose” on page 52 shows these elements:

- Historic Weather Data
For more information, see “Weather Data Table” on page 173.
- Historic Load Data
For more information, see “Load Table” on page 166.
- Other User-Defined Historic Data
For more information, see Chapter 26, “Add Additional Variables as Parameters,” on page 183.
- Calendar Data
For more information, see “Calendar Table” on page 162.

- Training Period

The training period is defined as the interval from the **Training Start Date** (“[Training Start Date](#)” on page 251) to the **Holdout Start Date** (“[Holdout Start Date](#)” on page 252). The data from the training period is used to re-estimate the parameters that are applied to the models that were developed in the diagnose step.

- Holdout Period

For the preceding input tables, this is the subset of each one that is used to test the accuracy of the forecast. In other words, a diagnose makes a load forecast for the holdout period; and because the holdout period contains actual historic data, it is possible to measure the accuracy of the forecast and select the best model.

The holdout period is the interval from the **Holdout Start Date** (“[Holdout Start Date](#)” on page 252) to the **Holdout End Date** (“[Holdout End Date](#)” on page 252).

See Also

- [Appendix 5, “Parameters,”](#) on page 251
- [“Period Parameters for Short-Term and Very Short-Term Forecast”](#) on page 59
- [Chapter 24, “Input Files,”](#) on page 161

One-Stage Diagnose

Models Produced by a One-Stage Diagnose

Here are the models that are produced by a one-stage diagnose, from less complex to more complex:

- Naive model (GLM-B)

A Naïve model is the benchmark model. For more information, see [“Generate a Naive Model”](#) on page 55.

- Recency model (GLM-BR)

A Recency model accounts for recent temperatures as they affect the best Naïve model. For more information, see [“Add the Recency Effect”](#) on page 55.

- Weekend model (GLM-BRW)

A Weekend model accounts for the weekend effect as it affects the best Recency model. For more information, see [“Add the Weekend Effect”](#) on page 55.

- Holiday model (GLM-BRWH)

A Holiday model accounts for how the holidays included in the calendar data set affect the best Weekend model. For more information, see [“Add the Holiday Effect”](#) on page 55.

- WLS (Weighted Least Squares) model (GLM-WeBRWH)

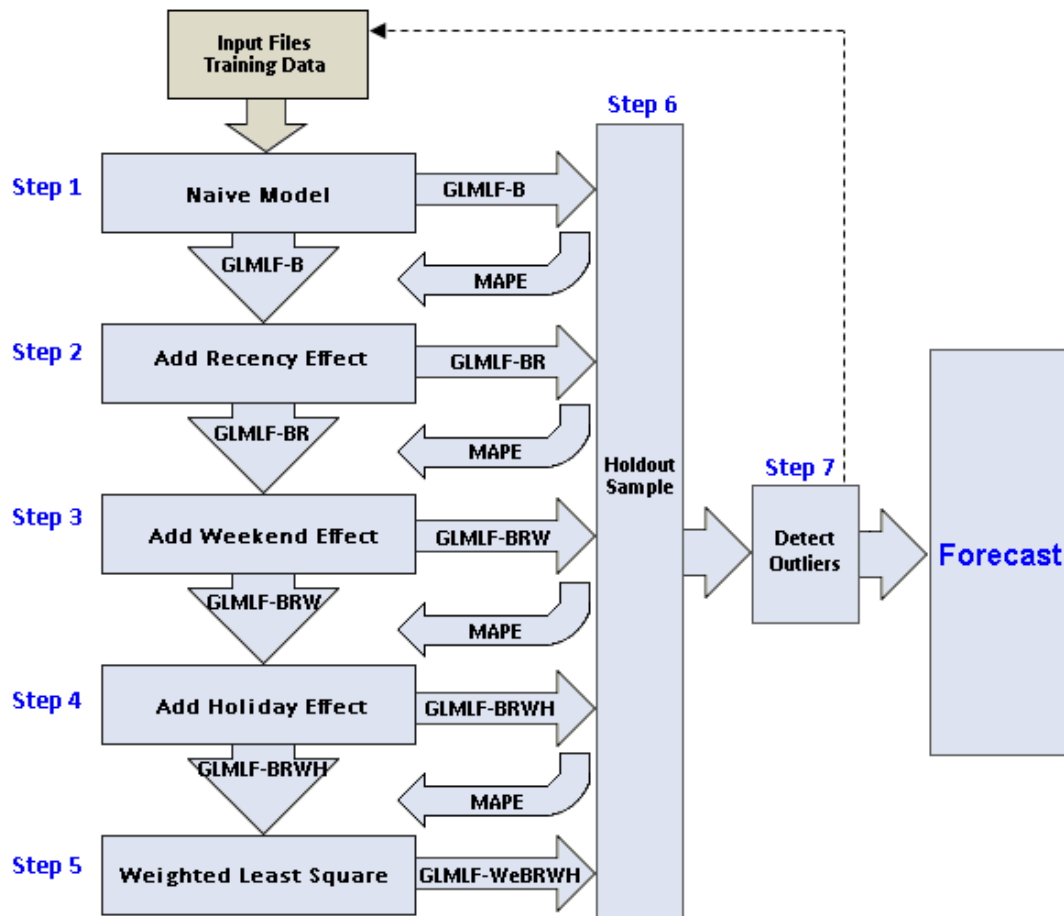
To emphasize the timing of events, higher weights are assigned to more recent observations. For more information, see [“Calculate Weighted Least Squares \(WLS\)”](#) on page 55.

Process

Overview

This figure shows the models that are produced during a one-stage diagnose.

Figure 11.2 Models Produced During One-Stage Diagnose



By comparing the forecast results of a particular model with the actual load data in the holdout period (data that is not used as input to the forecast), the system calculates a MAPE that is used to select the best model.

Here are the steps in the one-stage diagnose process:

1. “Generate a Naive Model” (See page 55.)
2. “Add the Recency Effect” (See page 55.)
3. “Add the Weekend Effect” (See page 55.)
4. “Add the Holiday Effect” (See page 55.)
5. “Calculate Weighted Least Squares (WLS)” (See page 55.)
6. “Analyze Errors” (See page 55.)
7. “Detect Outliers” (See page 56.)

Generate a Naive Model

As the first step, a benchmark is generated as the Naïve model. The Naïve model predicts hourly load as a function of a variety of seasonality- and temperature-independent variables.

Add the Recency Effect

The recency effect is added to the best Naïve model using models that include combinations of the following:

- the simple moving average of the temperatures from the preceding 24 hours
- the temperatures from preceding hours
- the weighted moving average of the temperatures from the preceding 24 hours

The forecast for each model combination is tested in the holdout period based on the MAPE or APE specified by the user in the diagnose parameters. After this comparison, the best model proceeds to the next step.

Add the Weekend Effect

The weekend effect is added to the best Recency model. This is done by grouping two adjacent days together and calculating the holdout MAPE generated by this grouping method. Only if the holdout MAPE improves should those two days continue to be grouped. All adjacent days are tried: Monday-Tuesday, Tuesday-Wednesday, Wednesday-Thursday, Thursday-Friday, Friday-Saturday, Saturday-Sunday, and Sunday-Monday.

Add the Holiday Effect

The holiday effect is added into the best Weekend model. Holidays are defined to reflect the local situation.

Models are first developed with the special days modeled as the weekday on which they occur. Models are then developed to test the special day considered to be all other day types of the week. If considering a special day as another day of the week improves model accuracy, then its weekday assignment is modified.

Calculate Weighted Least Squares (WLS)

The best Holiday model is modified to include four different exponential weighted least square temperature combinations. To emphasize recent status, higher weights are assigned to more recent observations, and an exponential WLS approach can be deployed. The best model from the four candidates is chosen.

Note: The WLS option tends to take a considerable amount of time and does not improve accuracy in most cases. It is recommended that this option not be selected during production runs.

Analyze Errors

The best model in each step is tested against the holdout period.

Here are the error statistics that are calculated for each of the models to identify the best model to use for forecasting:

- Hourly load (ME, MAE, and MAPE)
- Daily peak load (ME, MAE, and MAPE)
- Daily energy (ME, MAE, and MAPE)
- Monthly peak load (ME, MAE, and MAPE)

- Monthly energy (ME, MAE, and MAPE)
- Annual peak load (ME, MAE, and MAPE)
- Annual energy (ME, MAE, and MAPE)
- Weighted_MAPE

For more information, see [Appendix 4, “Error Analysis Equations,”](#) on page 249.

Detect Outliers

For each model, the hours with the highest error statistics are identified. This allows identification of data errors and model specification problems by reviewing error statistics, load, predicted load, and temperature for each of those hours. Large percentage errors should be investigated and adjustments made to the historic data by substituting with representative values or adding event variables to the other data.

The data in this sample outlier table is ranked by descending APE and the top n percent (default is 0.1 percent) of the observations are included:

Figure 11.3 Sample Outlier Table

VIEWTABLE: outlier_table_wls											
	Datetime	Weekday	Original Weekday	Holiday Indicator	Wthr Value	Actual MW	Predicted Load	Error	Absolute Error	Absolute Percentage Error	Outlier Flag
1	31Oct2011:06:00:00	2	2	0	28	1981	2975.744015	-994.744015	994.7440153	0.50214236	wls_holiday_4
2	31Oct2011:03:00:00	2	2	0	27	1757	2639.511996	-882.511996	882.5119964	0.502283436	wls_holiday_4
3	30Oct2011:04:00:00	5	1	0	34	1696	2548.672701	-852.672701	852.6727015	0.502755131	wls_holiday_4
4	29Aug2011:03:00:00	2	2	0	61	1611	2440.379544	-829.379544	829.3795444	0.514822808	wls_holiday_4
5	31Oct2011:08:00:00	2	2	0	36	2482	3766.56256	-1284.56256	1284.56256	0.517551394	wls_holiday_4
6	31Oct2011:07:00:00	2	2	0	32	2275	3465.841836	-1190.84184	1190.841836	0.523446961	wls_holiday_4
7	29Aug2011:02:00:00	2	2	0	63	1663	2535.330771	-872.330771	872.3307714	0.524552478	wls_holiday_4
8	30Oct2011:22:00:00	5	1	0	32	2279	3488.78881	-1209.78881	1209.78881	0.530841953	wls_holiday_4
9	30Oct2011:21:00:00	5	1	0	32	2408	3690.665238	-1282.66524	1282.665238	0.532668288	wls_holiday_4
10	30Oct2011:23:00:00	5	1	0	30	2111	3244.268735	-1133.26874	1133.268735	0.536839761	wls_holiday_4
11	29Oct2012:19:00:00	2	2	0	68	2517	3873.734977	-1356.73498	1356.734977	0.539028596	wls_holiday_4
12	29Aug2011:08:00:00	2	2	0	63	2193	3375.275503	-1182.2755	1182.275503	0.539113317	wls_holiday_4

Two-Stage Diagnose

Models Produced by a Two-Stage Diagnose

Here are the models that are produced by a two-stage diagnose:

- GLM_UCM model
 - Unobserved Components model
- GLM_NN model
 - Neural Network model
- GLM_ESM model
 - Exponential Smoothing model
- GLM_ARIMAX model
 - Auto Regressive Integrated Moving Average with Exogenous Input model
- Combined model

A combination of any or all of these two-stage models. The results of the models chosen are averaged to produce a combined result. See [“Combine Forecast” on page 255](#).

Process

Here is the process for a two-stage diagnose model:

1. The residual of the best model from the one-stage diagnose process is calculated.
2. Using the residual, the two-stage models are created and forecast.

See Also

- [“Models Produced by a One-Stage Diagnose” on page 53](#)
- [“Models Produced by a Two-Stage Diagnose” on page 56](#)

Chapter 12

Short-Term and Very Short-Term Forecasting

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Period Parameters for Short-Term and Very Short-Term Forecast

Overview

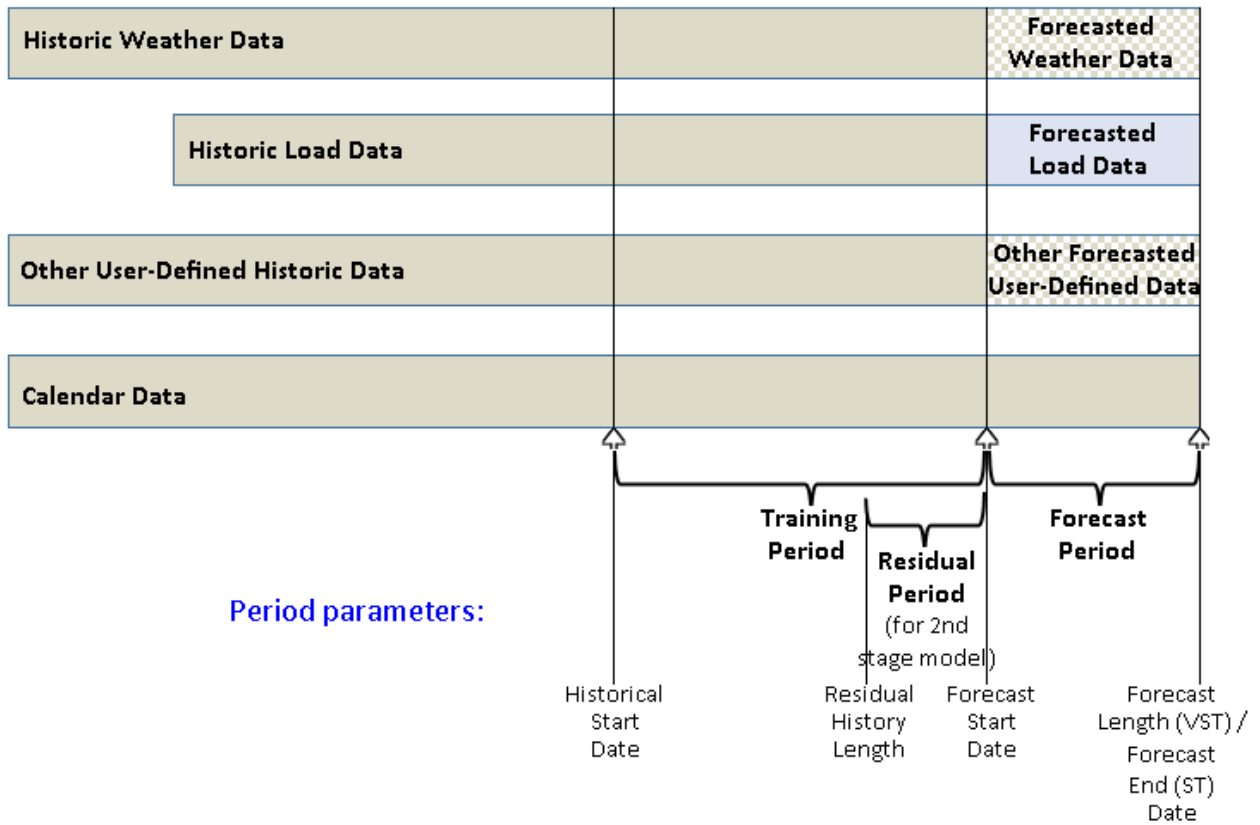
Here are the parameters that you use to specify the periods for short-term and very short-term forecast:

- Historical Start Date
- Forecast Start Date
- Forecast Start Hour
- Forecast Length
- Forecast End Date

For guidance on setting of these parameters, see [“Diagnose Parameter Selection and Forecast Performance”](#) on page 80.

This figure shows the relationship between the period parameters and the input tables used for short-term and very short-term forecasting.

Figure 12.1 Relationship Between Period Parameters And Input Tables



See Also

- “Very Short-Term Forecasting Parameters” on page 258
- “Short-Term Forecasting Parameters” on page 260

Very Short-Term Forecasting

Overview

Very short-term load forecasting is typically used by portfolio managers, energy traders, and system operators. It typically has a horizon of one to 24 hours, but it could be longer. It can be enabled to run every time the actual load and weather data is changed, so that you have the most up-to-date forecast. When you create the forecast definition, you specify either the best model from the diagnose process or another model. Results for the model are displayed in the RESULTS file. If you select RESULTS_ALL, you can see the results for the other top models from the diagnose.

As the forecasts are updated throughout the day, you can track how forecasted values deviate from actual values and how the forecast changes from hour to hour. There are two types of very short-term load forecasting:

- Ex-ante forecasting

For the future period, load forecasting uses forecasted weather information.

- Ex-post forecasting

Actual weather (which has become available after a forecast was done) is used for the historical period, but the actual load for the same period is not used. Load forecasting uses the actual weather information.

If you enable the backcasting feature (Ex-post forecasting), then a prior period's forecast is rerun using actual weather data. A comparison of the forecast and backcast values for a specific period can help assess model performance.

The forecast requires as input a weather data table that contains the expected hourly temperature for each hour of the forecast. For more information, see [“Weather Data Table” on page 173](#).

In addition to a one-stage model, very short-term load forecasting can also use a two-stage model. The trend variable from the diagnose is replaced with a load-lagged value; the model is re-estimated across the training period, and it is tested in the holdout period. A two-stage model is run to fit the holdout period residuals for each hour.

Here is a summary of the very short-term modeling methodology:

Forecast Temperature	Updating Cycle	Horizon
Required	<= 1 hour	Within 1 day

See Also

- [Chapter 15, “Working with Forecasts,” on page 83](#)
- [“Very Short-Term Forecasting” on page 60](#)
- [Chapter 18, “Viewing the Results,” on page 99](#)
- [“Very Short-Term Forecast Results” on page 279](#)

One-Stage Very Short-Term Forecasting

This figure shows the one-stage process for very short-term forecasting.

Figure 12.2 One-Stage Process For Very Short-Term Forecasting

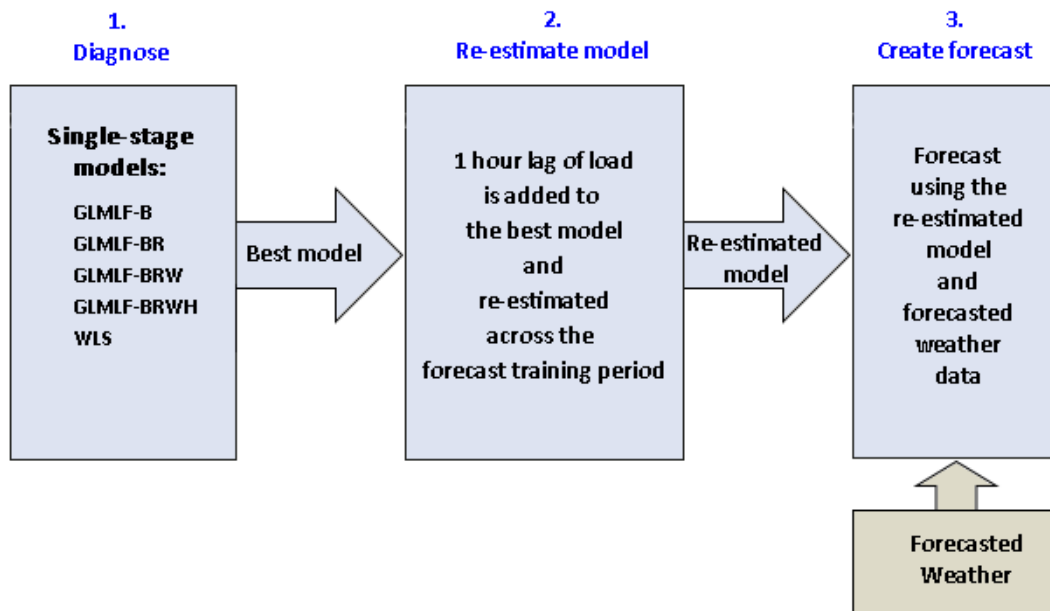


Figure 12.2 on page 62 shows these points:

1. The forecasting process receives the best model from the single-stage diagnose.
For more information, see “Models Produced by a One-Stage Diagnose” on page 53.
2. A load-lag of 1 hour is added to the model from step 1 and the model is re-estimated.
3. The load is forecasted using the re-estimated GLM model from the diagnose process and forecasted weather data for the forecast period.

Two-Stage Very Short-Term Forecasting

This figure shows the two-stage process for very short-term forecasting.

Figure 12.3 Two-Stage Process For Very Short-Term Forecasting

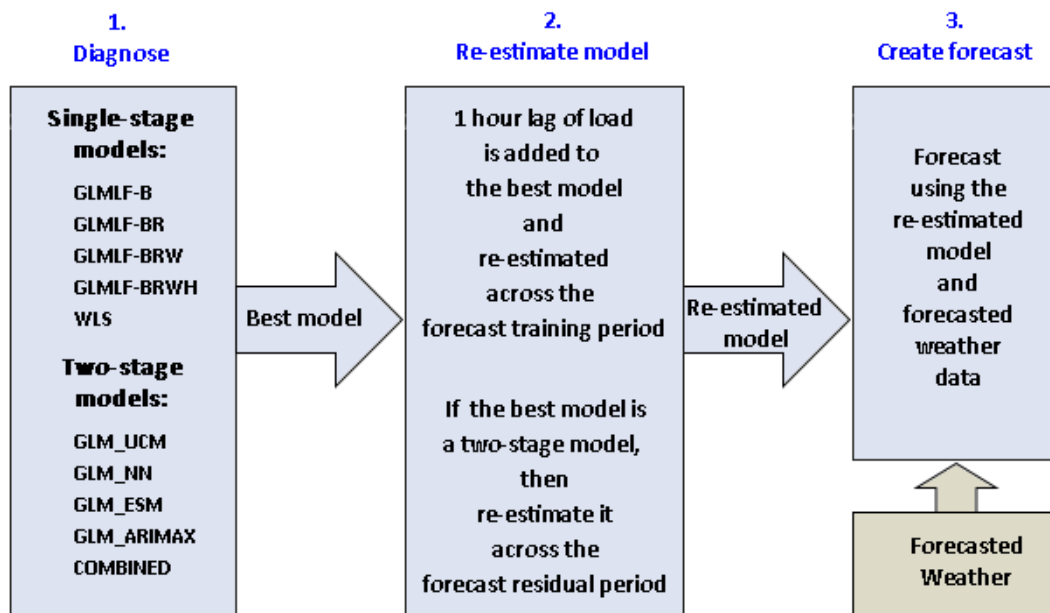


Figure 12.3 on page 63 shows these points:

1. The forecasting process receives the best GLM model from the single-stage diagnose.

For more information, see [“Models Produced by a One-Stage Diagnose”](#) on page 53.

If **Two Stage** was selected for the diagnose ([“Two Stage”](#) on page 255), the two-stage models are created.

For more information, see [“Models Produced by a Two-Stage Diagnose”](#) on page 56.

2. The best model is received from the diagnose process. It is important to note that haven chosen **Two Stage**, if the best model from the diagnose is a single stage model, then it is the single stage model that is used for forecasting.

These events occur:

- a. One-hour load lag is added, and the model is re-estimated.

If the best model from the diagnose process is not the WLS holiday model, then the load lag of the previous hour is added to it, and the model is re-estimated (coefficients recalculated).

Otherwise, the load lag of the previous hour is added to the second-best model, and the model is re-estimated.

- b. The best second-stage model is re-estimated.

If, and only if, the best model from the diagnose process is a two-stage model, then it is re-estimated across the residual forecast period. For more information, see [“Residual History Length”](#) on page 255.

- The load is forecasted using the re-estimated model from Step 2 and forecasted weather data for the forecast period.

Examples of Very Short-Term Forecasting

One-Hour-Ahead Forecasting

Assume that we are at some point between 7:00 a.m. and 8:00 a.m. and want a forecast for 9:00 a.m. for that particular day. All time points prior to and including 7:00 a.m. of Day 1 have historical load data but all time points after have no historical load data. Since the model requires the load for the previous hour, the load for 8:00 a.m. is needed to forecast the load for 9:00 a.m. The actual load for 8:00 a.m. is, of course, not available, so this procedure is followed:

- Forecast the load at 8:00 a.m. using historical load data.
- Use the forecast load for 8:00 a.m. as load($t-1$) in the model along with the historical load to forecast the load for 9:00 a.m.

...	Day 1, 7:00 a.m.	Day 1, 8:00 a.m.	Day 1, 9:00 a.m.	Day 1, 10:00 a.m.	Day 1, 11:00 a.m.
Historical data is available	Current time point	Future time point	Future time point	Future time point	Future time point

One-Day-Ahead Forecasting

Assume we are at some point between 7:00 a.m. and 8:00 a.m. of Day 1 and want forecasts for every hour of Day 2, this procedure should be followed:

- Forecast the load for 8:00 a.m. of Day 1 using historical load data.
- Use the forecast load for 8:00 a.m. of Day 1 as load($t-1$) in the model along with the historical load to forecast the load for 9:00 a.m. of Day 1.
- Use the forecast load for 9:00 a.m. of Day 1 as load($t-1$) in the model along with the historical load to forecast the load for 10:00 a.m. of Day 1.
- ⋮
- Use the forecast load for 11:00 p.m. of Day 1 as load($t-1$) in the model along with the historical load to forecast the load for midnight of Day 2.
- Use the forecast load for midnight of Day 2 as load($t-1$) in the model along with the historical load to forecast the load for 1:00 a.m. of Day 2.
- Use the forecast load for 1:00 a.m. of Day 2 as load($t-1$) in the model along with the historical load to forecast the load for 2:00 a.m. of Day 2.
- ⋮
- Use the forecast load for 11:00 p.m. of Day 2 as load($t-1$) in the model along with the historical load to forecast the load for midnight of Day 3.

This procedure does one hour ahead for each hour of Day 2, a total of 24 calculations. At the end of it, the forecast load for every hour of Day 2 (a complete “day”) has been obtained.

...	Day 1, 7:00 a.m.	Day 1, 8:00 a.m.	Day 1, 9:00 a.m.	Day 1, ...	Day 2, 1:00 a.m.	Day 2, 2:00 a.m.	Day 2, ...	Day 3, midnight
Historical data is available	Current time point	Future time point	Future time point	Future time point	Future time point	Future time point	Future time point	Future time point

Short-Term Forecasting

Overview

Short-term load forecasting is typically updated daily with a horizon from one day to two weeks. Forecast values are generated for each hour of the forecast horizon. Results of the forecast are used by asset managers, energy traders, system operators, supply planners, and many other organizations within a utility. Forecast results are generated for either the best model that was selected in the diagnose stage or a model that you specify when you create the forecast definition. The results can be viewed in both graphical and tabular form. Forecast results for other models can be viewed as well and the user can compare the models and their corresponding quality value, such as MAPE.

Short-term load forecasting (STLF) generally means hourly forecasting for less than 2 weeks starting from the processing time. But, since there are lags (in days) for the actual load data to be received, each series might need more than a 7 day ahead forecast (but should be within 2 weeks). There are two types of short-term load forecasting:

- Ex-ante forecasting: for 14 days ahead, load forecasting used forecasted weather information
- Ex-post Forecasting: for the historical days with actual weather but not actual load, load forecasting uses actual weather information

The forecast requires as input a weather data table that contains the expected hourly temperature for each hour of the forecast. For more information, see [“Weather Data Table” on page 173](#).

Here is a summary of the short-term modeling methodology.

Forecast Temperature	Updating cycle	Horizon
Required	1 day	1 day to 2 weeks

See Also

- [Chapter 15, “Working with Forecasts,” on page 83](#)
- [“Short-Term Forecasting Parameters” on page 260](#)
- [“Short-Term Forecasting” on page 65](#)
- [Chapter 18, “Viewing the Results,” on page 99](#)

- “Short-Term Forecast Results” on page 280

One-Stage Short-Term Forecasting

This figure shows the one-stage process for short-term forecasting.

Figure 12.4 One-Stage Process For Short-Term Forecasting

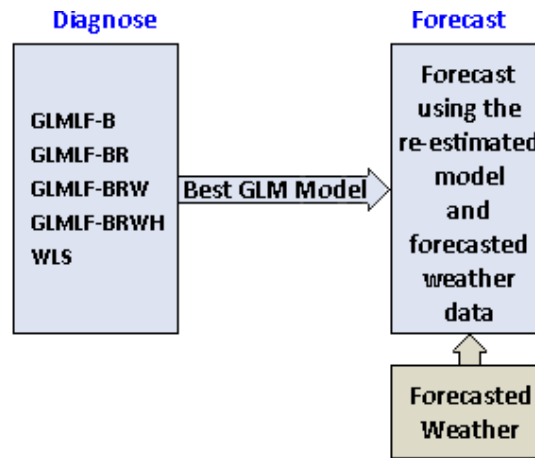


Figure 12.4 on page 66 shows these points:

- The forecasting process receives the best model from the single-stage diagnose.
For more information, see “Models Produced by a One-Stage Diagnose” on page 53.
- The load is forecasted using the best GLM model from the diagnose process and forecasted weather data for the forecast period.

Note: When you create the forecast definition, you can specify a model other than the best model from the diagnose.

Two-Stage Short-Term Forecasting

This figure shows the two-stage process for short-term forecasting.

Figure 12.5 Two-Stage Process For Short-Term Forecasting

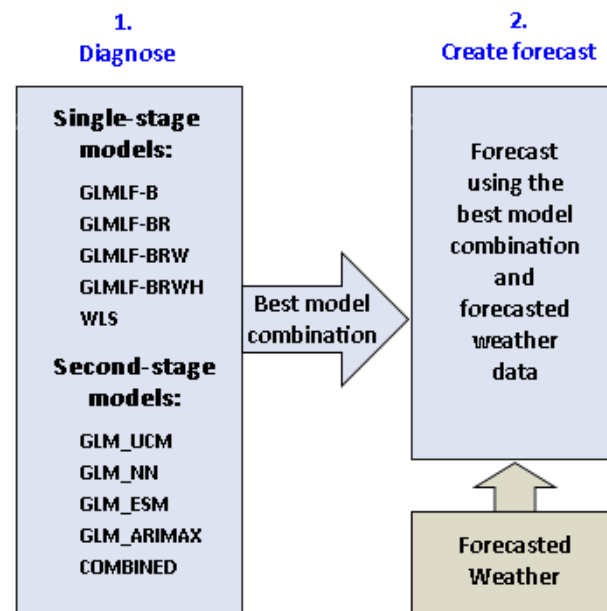


Figure 12.5 on page 67 shows these points:

- The forecasting process receives the best GLM model from the single-stage diagnose.

For more information, see “[Models Produced by a One-Stage Diagnose](#)” on page 53.

If **Two Stage** was selected for the diagnose (“[Two Stage](#)” on page 255), the two-stage models of residuals are created.

For more information, see “[Models Produced by a Two-Stage Diagnose](#)” on page 56.

- The load is forecasted using the best model combination from Step 1 and forecasted weather data for the forecast period.

Note: When you create the forecast definition, you can specify a model other than the best model from the diagnose.

Chapter 13

Medium-Term/Long-Term Forecasting

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Overview

Medium-term load forecasting generally means hourly forecasting for the rest of the current month and through approximately 3 years ahead. Long-term load forecasting generally means forecasting for more than 3 years ahead. In actuality, the terms of various forecasts can vary widely among utilities.

A key differentiating feature of medium-term/long-term forecasting from shorter term forecasts is that it takes into account economic and/or demographics data (for example, customer counts or GDP), whereas neither is considered for short-term or very short-term forecasting.

Another difference is that for medium-term/long-term forecasting, it is impractical to forecast daily weather data far out into the future. To remedy this problem, SAS Energy Forecasting supports two methods of medium-term/long-term forecasting: probabilistic forecasting and point forecasting.

See Also

- [Chapter 15, “Working with Forecasts,” on page 83](#)
- [“Medium-Term/Long-Term Forecasting Parameters” on page 263](#)
- [Chapter 13, “Medium-Term/Long-Term Forecasting,” on page 69](#)
- [Chapter 18, “Viewing the Results,” on page 99](#)
- [“Point Forecast Results” on page 281](#)

- [“Probabilistic Forecast Results” on page 283](#)

Probabilistic Forecasting

Overview

When you choose probabilistic forecasting, you must specify the parameters **Historical Temperature Start** ([on page 263](#)) and **Historical Temperature End** ([on page 263](#)) to designate a subset of historical weather data to use as the predicted weather data for the forecast period. Suppose, for example, that you specify 30 years of historical weather data to use as the predicted weather data for the forecast period. SAS Energy Forecasting proceeds as follows:

1. Use the temperature for hour 1 of the first year of this historical weather data to predict an energy load for hour 1 of the forecast period.
2. Use the temperature for hour 1 of the second year of this historical weather data to make a second energy load prediction for hour 1 of the forecast period.
3. Repeat the process until the temperature for hour 1 of the 30th year is used to predict the 30th energy load value for hour 1 of the forecast period.
4. Continue the process until all hours of the year are completed.
5. Repeat the process for each year specified in the parameters for the historical load.
6. After the process is complete, the forecast data can be evaluated probabilistically on the desired time interval. Annual max, mean, median, p_{10} (10th percentile) and p_{90} (90th percentile) annual are summarized for peak load.

CAUTION:

A probabilistic forecast is created for each of your economic scenarios. This can result in very large data files and increased processing time. For example, 30 years of temperature data, 10 years of historical load data, and four economic scenarios generates 1,200 forecasts (30x10x4) during the development of a probabilistic forecast.

Data Input and Period Parameters for Probabilistic Forecasting

Overview

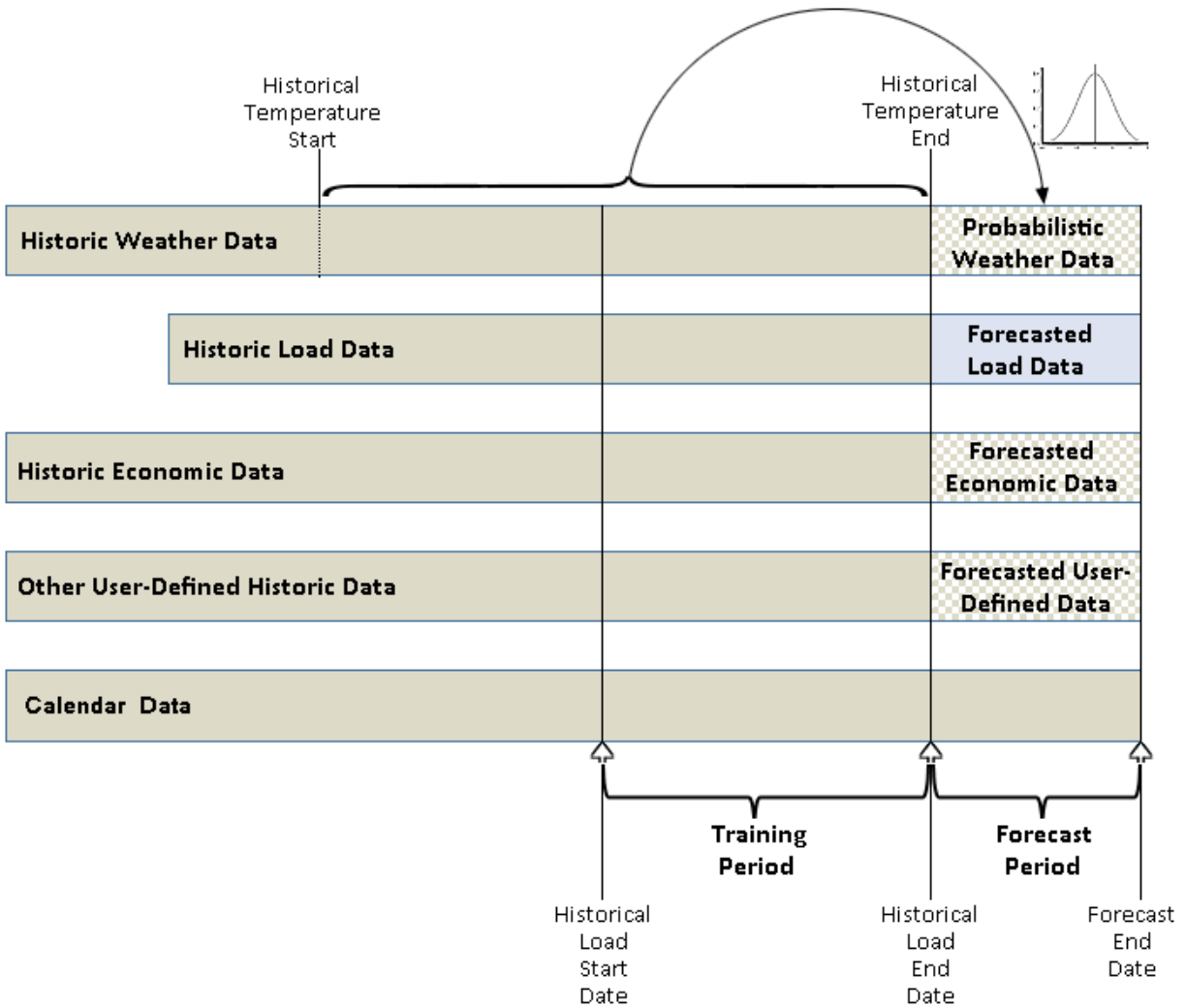
Here are the parameters that you use to specify the periods for medium-term and long-term diagnose and forecast:

- Historical Temperature Start
- Historical Temperature End
- Historical Load Start Date
- Historical Load End Date
- Forecast End Date

For guidance on setting these parameters, see [“Diagnose Parameter Selection and Forecast Performance” on page 80](#).

This figure shows the data input and period parameters for medium-term or long-term probabilistic forecasting:

Figure 13.1 Data Input and Period Parameters for Probabilistic Forecasting



Data Input

Figure 13.1 on page 71 shows these elements:

- Historic Weather Data
For more information, see “Weather Data Table” on page 173.
- Historic Load Data
For more information, see “Load Table” on page 166.
- Historic Economic Data
For more information, see “Economic Table” on page 164.
- Other User-Defined Historic Data
For more information, see Chapter 26, “Add Additional Variables as Parameters,” on page 183.

- Calendar Data

For more information, see [“Calendar Table” on page 162](#).

- Probabilistic Forecast Weather Data

The predicted weather data is defined as weather during the interval from **Historical Temperature Start** ([“Historical Temperature Start” on page 263](#)) to **Historical Temperature End** ([“Historical Temperature End” on page 263](#)).

- Training Period

For the preceding input tables, this is the subset of each one that is used for diagnose process to select the best model. The training period is defined as the interval from the **Historical Load Start Date** ([“Historical Load Start Date” on page 265](#)) to the **Historical Load End Date** ([“Historical Load End Date” on page 265](#)).

- Forecast Period

The period being forecast.

See Also

[“Main Parameters for Probabilistic Forecasting” on page 263](#)

Point Forecasting

Overview

When you choose point forecasting, you must provide a full year of predicted weather by supplying the input file `typical_wthr_data` ([“Typical Weather Year Table” on page 168](#)). SAS Energy Forecasting proceeds as follows:

1. Use the temperature for hour 1 of the `typical_wrthr_data` table to predict an energy load for hour 1 of the forecast period.
2. Use the temperature for hour 2 of the `typical_wrthr_data` table to predict an energy load for hour 2 of the forecast period.
3. Continue stepping through the `typical_wrthr_data` table until energy load predictions have been made for every hour of the forecast period.

Note: SAS Energy Forecasting also uses historical load data and your provided economic scenarios in making its energy load predictions. And, after predicting the first year of the forecast period, SAS Energy Forecasting rotates the data in the `typical_wrthr_data` table so that peaking temperatures occur on the same days of the week. Therefore, peak load predictions occur on equivalent days in subsequent years as in the first year of predicted energy loads. The rotation requires a seed year (as defined by your `typical_wthr_data` table) to define how the temperatures line up with days of the week. The rotation begins from this seed year.

Point forecasts take much less time to produce than probabilistic forecasts because only one year of weather data is used for making predictions rather than multiple years, which require running multiple forecasts—one for each hour of each day of each year of historical weather data used for the forecast.

Data Input and Period Parameters for Point Forecasting

Overview

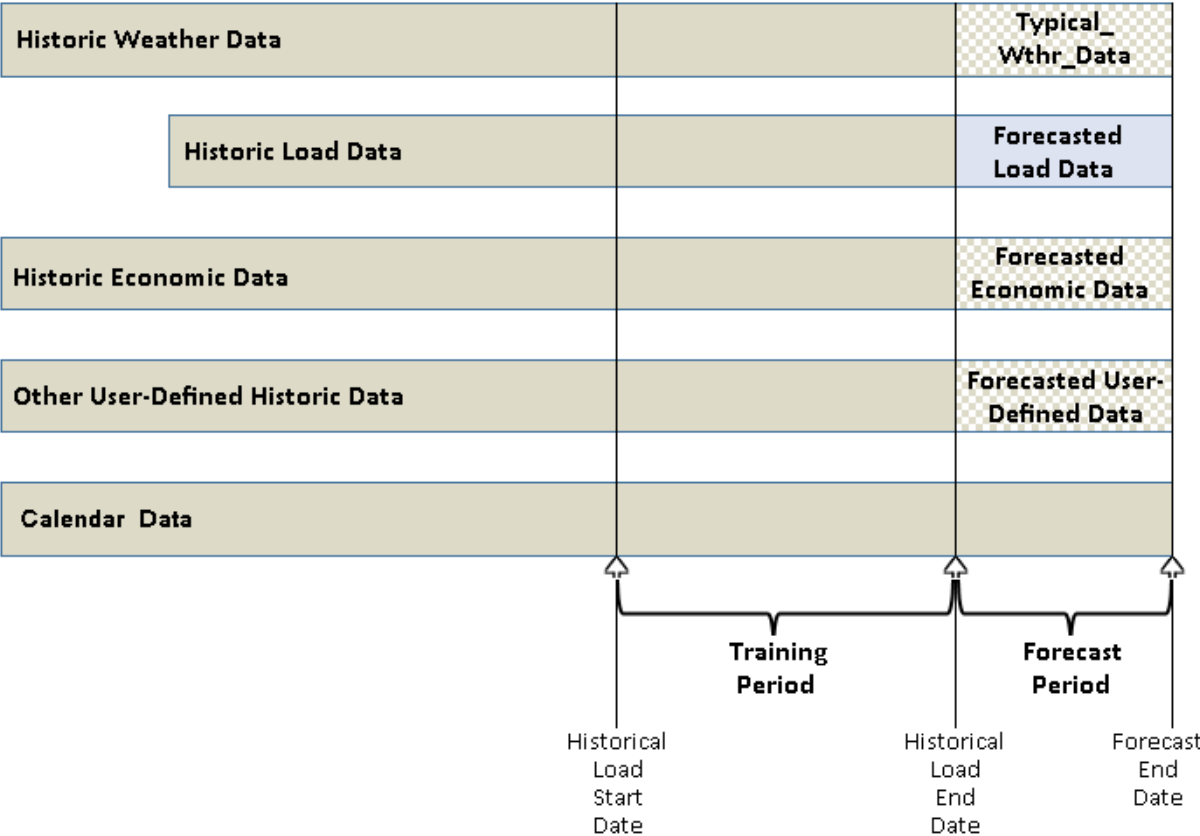
Here are the parameters that you use to specify the periods for medium-term and long-term diagnose and forecast:

- Historical Load Start Date
- Historical Load End Date
- Forecast End Date

For guidance on setting these parameters, see “Diagnose Parameter Selection and Forecast Performance” on page 80.

This figure shows the data input for medium-term or long-term point forecasting.

Figure 13.2 Data Input and Period Parameters for Point Forecasting



Data Input

Figure 13.2 on page 73 shows these elements:

- Historic Weather Data

For more information, see [“Weather Data Table” on page 173](#).

- Historic Load Data

For more information, see [“Load Table” on page 166](#).

- Historic Economic Data

For more information, see [“Economic Table” on page 164](#).

- Other User-Defined Historic Data

For more information, see [Chapter 26, “Add Additional Variables as Parameters,” on page 183](#).

- Calendar Data

For more information, see [“Calendar Table” on page 162](#).

- Point Forecast Weather Data

Specify a year’s worth of predicted weather data in the table `typical_wthr_data`. This represents a typical weather year that is used to create the point forecast. The values in the `typical_wthr_data` table are rotated during the forecast to maintain peak values on the same day of the week in the forecasted period as in the historical period. The year in the `typical_wthr_data` table is used to start the rotation.

- Training Period

For the preceding input tables, this is the subset of each one that is used for diagnose process to select the best model. The training period is defined as the interval from the **Historical Load Start Date** ([“Historical Load Start Date” on page 265](#)) to the **Historical Load End Date** ([“Historical Load End Date” on page 265](#)).

- Forecast Period

The period being forecast.

See Also

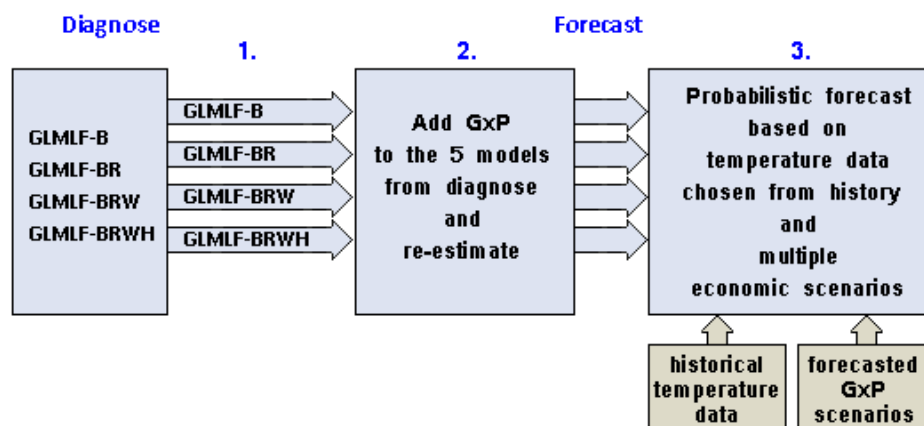
[“Diagnose Parameters” on page 251](#)

The Medium-Term/Long-Term Forecasting Process

The diagnose process for medium-term/long-term forecasting does not generate two-stage models and does not include a weighted least squares (WLS) model.

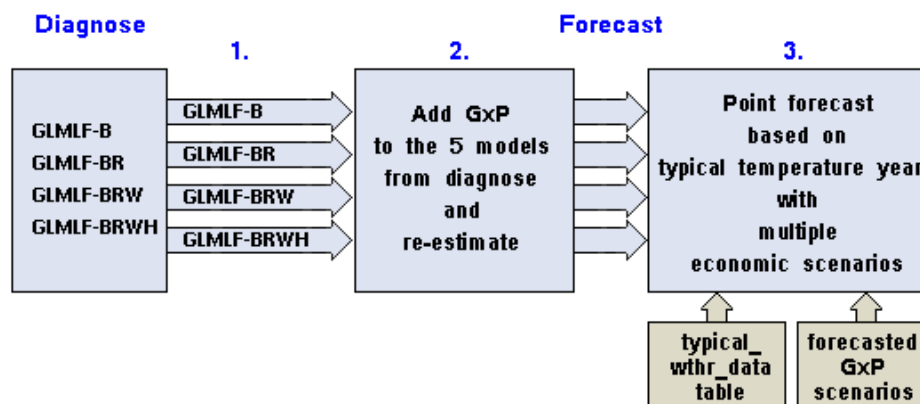
This figure shows the process for medium-term/long-term load forecasting using probabilistic forecasting.

Figure 13.3 Diagnose Process For Medium-Term/Long-Term Load Forecasting Using Probabilistic Forecasting



This figure shows the process for medium-term/long-term load forecasting using point forecasting.

Figure 13.4 Diagnose Process For Medium-Term/Long-Term Load Forecasting Using Point Forecasting



The modeling methodology for medium-term/long-term forecasting is as follows:

1. Receive the five best candidate models from the diagnose process.
2. Replace the trend with gross x product (GxP) and interact GxP with all variables.

Note: The historical economic data must go back to the same time as the Historical Load Start Date and go through the horizon of the forecast (to the Forecast End Date). The data is used to adjust the trend in the model. Data must be in hourly increments, which means that the typical monthly values must be applied on an hourly basis.

Other aspects of the medium-term/long-term forecasting methodology are as follows:

- For a national utility, GxP can be gross domestic product
- For a cross-state utility or state power system, GxP can be gross state product

- For a utility with service territory covering a metropolitan area, GxP can be gross metropolitan product.

Part 4

Forecasting

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Chapter 14

General Forecasting Process

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Overview

1. Create a project.
For more information, see [“Create a Project”](#) on page 27.
2. Create a diagnose definition.
For more information, see [“Create or Edit a Diagnose Definition”](#) on page 28.
3. Run the diagnose.
For more information, see [“Run the Diagnose”](#) on page 29.
4. Identify the best model.
For more information, see [“Identify the Best Model”](#) on page 29.
5. Create a forecast definition.
For more information, see [“Create or Edit a Forecast Definition”](#) on page 29.
6. Run the forecast.
For more information, see [“Run the Forecast”](#) on page 30.

Diagnose Parameter Selection and Forecast Performance

Overview

How you specify parameters for a diagnose affects both how long it takes to run a forecast and the quality of forecast MAPE.

Generally, a diagnose can take from 30 minutes to as long as 12 hours to run, so it is recommended that you run these at night or over the weekend. SAS Energy Forecasting has an adjustable timer that is defaulted to allow a solution to run up to 12 hours before it times out. If a diagnose fails due to this default, you can adjust the value by changing the system time out value. For more information, see [“Manage Application Settings” on page 158](#). It is recommended that you increase the diagnose time-out for medium-term/long-term forecasting to 1440 minutes to ensure a successful diagnose.

If, during the setup for a forecast run, you decide to write report data to the server, the execution times might increase because of the large volumes of data being appended to the report files. For more information, see [Chapter 20, “Producing Reports,” on page 111](#).

Very Short-Term Forecasts

Run Time

The amount of time required to run a forecast depends primarily on your choice of these parameters:

- One-stage or two-stage model

The choice of either one- or two-stage model in diagnose determines how many models are consumed in the diagnose and subsequently the forecast process.

Selecting a two-stage model as the diagnose parameter does not guarantee that a two-stage model will be chosen as the best model. The length of the holdout period selected in diagnose also impacts the best model chosen during the diagnose process.

For more information, see [Chapter 11, “The Diagnose Process,” on page 51](#).

- Holdout period (holdout end date – holdout start date)

The holdout period is the period between holdout start date and holdout end date. The holdout period is a selected subset of the historical data that is held from the data used in developing the various models but is used later to test the accuracy of the various models during error analysis process by calculating mean error (ME), mean absolute error (MAE), and mean absolute percentage error (MAPE). A shorter holdout period might result in the diagnose process selecting a single stage model as the best model. A longer holdout period might result in the diagnose process selecting a two-stage model as the best model. When a forecast is run against the diagnose, the number of models used in the analysis depends on whether a one-stage or two-stage model was selected as the best model. A one-stage model typically uses two models in the forecast while a two-stage model can have up to seven models being consumed during the forecast process. And, the more models used the longer it takes to do the forecast.

Here are basic rules of thumb:

- Longer holdout generally results in the best model from a diagnose being a two-stage model.
- Shorter holdout generally results in the best model from a diagnose being a one-stage model. In general, a one-stage model for diagnose results in a faster forecast than a two-stage diagnose.
- Performance optimization

For very short-term forecasts, you can select **Performance-Optimized Forecast** to reduce the time required to produce the forecast without (in general) significantly affecting its accuracy. This option causes some parameter re-estimation to be bypassed. For more information, see “[Performance-Optimized Forecast](#)” on page 258.

MAPE

The diagnose MAPE also depends primarily on your choice of the same parameters:

- One-stage or two-stage model
Generally, a two-stage model for diagnose results in a better MAPE for the resulting model.
- Holdout period (holdout end date – holdout start date)
Generally, the longer the holdout period for diagnose, the better the MAPE for the resulting model.

Short-Term Forecasts

Short-term forecasts are typically run monthly or quarterly, so diagnose execution times are not as important as in very short-term forecasts. A holdout period of 30 to 90 days with 2-stage diagnose is sufficient to produce acceptable MAPEs in short-term forecasts. Testing has produced run times for forecasts that are generally less than 5 minutes. Longer holdout periods and more history data generally produce better accuracy as measured by hourly MAPE.

Medium-Term/Long-Term Forecasts

Medium-term/Long-term forecasts are typically run once or twice a year, so diagnose execution times are generally not critical.

- A holdout period of 90 days or more produces acceptable MAPEs in medium-term/long-term forecasts.
- A longer holdout period results in longer execution times, so a medium-term/long-term diagnose can be run at night or on weekends.

Scheduling Forecasts

You should periodically rerun the diagnose process to ensure that you are forecasting with an optimal model.

After you have a satisfactory diagnose for each type of forecast, you can use a scheduler (such as UNIX Cron, Windows Task Scheduler, or SAS scheduling) to automate these tasks:

- Transform raw data to input data set format.

Assuming that you receive new load and weather data on a regular basis, you can schedule SAS Data Integration Studio jobs to transform the new data to the required input data set format. For more information, see [Chapter 24, “Input Files,” on page 161](#).

- Run forecasts with the new input data.

Once the new data is in input data set format, you can schedule running the forecasts. You can specify which forecasts to run so that you can run, for example, short-term and very short-term forecasts at different times. For more information, see [Appendix 2, “Run an Event-Triggered Forecast,” on page 211](#).

- Archive forecast results.

SAS Energy Forecasting is very data-intensive—it uses large amounts of data and generates large amounts of data. Unless you systematically clean up your result data sets, you risk using up your disk space. SAS Energy Forecasting provides methods to archive your forecasting and diagnose results to free up disk space and preserve forecast results. For more information, see [“Archive Results Data” on page 230](#).

Chapter 15

Working with Forecasts

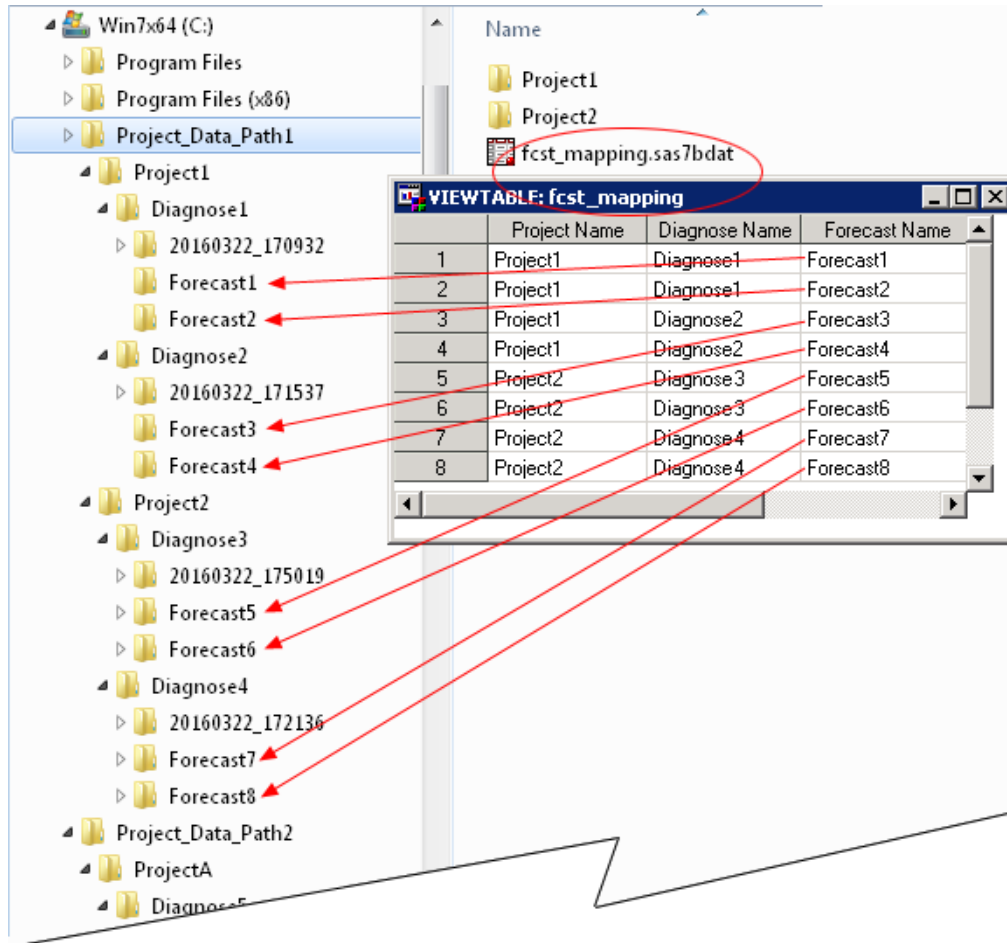
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Accessing a List of Forecasts

Whenever you create a forecast, the name of the forecast is added to a file named FCST_MAPPING. The file lists, for every project in the base location in the project's data path, the forecasts that belong to that project and the name of the forecast's diagnose. You can use the FCST_MAPPING file along with SAS programs that you create to work with and compare forecast results.

This figure shows a FCST_MAPPING file that lists eight forecasts, all of which belong to the two projects (Project1 and Project2) that are in the base location `C:\ProjectDataPath1`.

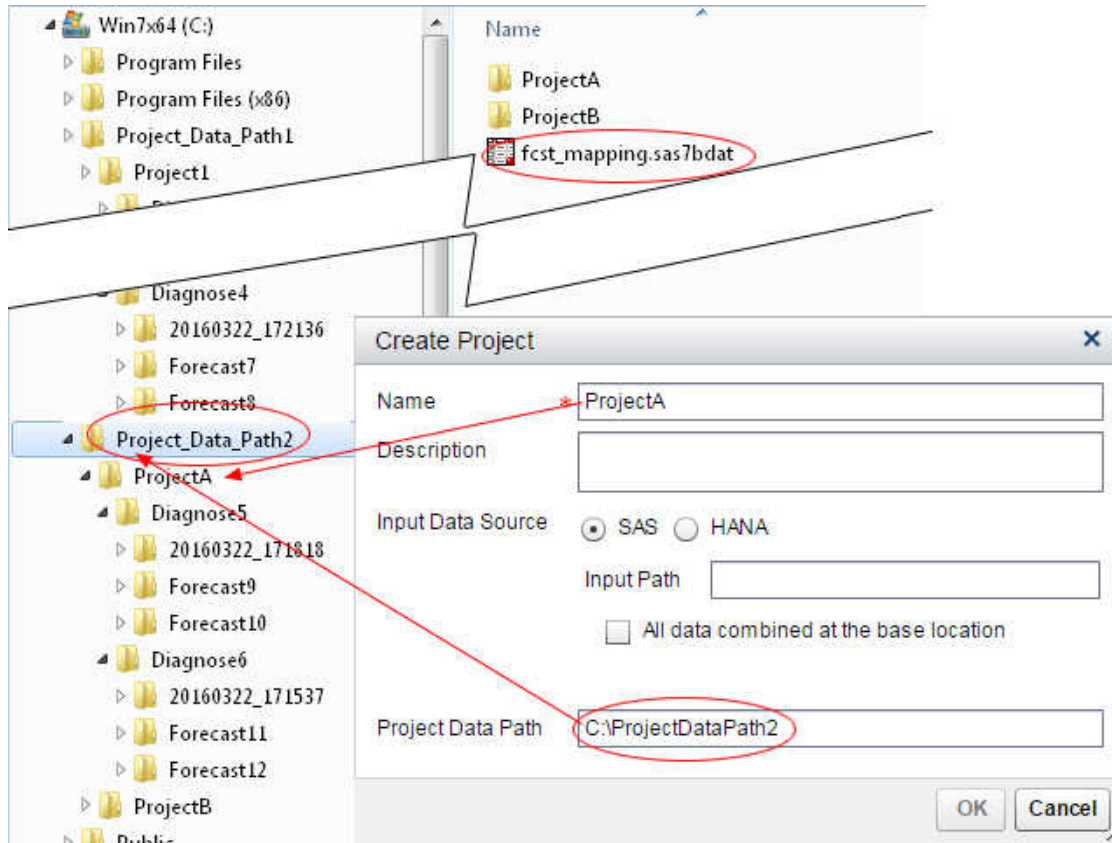
Figure 15.1 Example FCST_MAPPING File



There can be multiple FCST_MAPPING files. There is one FCST_MAPPING file per base location of a Project Data Path.

This figure shows a second FCST_MAPPING file in the folder Project Data Path2. This folder is created when a new project is created whose Project Data Path is C:\ProjectDataPath2.

Figure 15.2 Example Second FCST_MAPPING File



See Also

[“Project Data Path” on page 12](#)

Run a Forecast in Batch

You can use the batch API to run a forecast or diagnose in batch, completely bypassing the SAS Energy Forecasting user interface. However, you can view the results of the diagnose or forecasts in the user interface.

You can also run the %SEFDATAE macro outside of the SAS Energy Forecasting user interface to run a forecast. Using the %SEFDATAE macro, you can run new forecasts whenever you update your weather, load, or economic data.

See Also

[Appendix 3, “Batch API,” on page 215](#)

Chapter 16

Backcasting

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Overview

Backcasting, also known as *ex-post forecasting*, is energy forecasting using actual weather data instead of predicted weather data. Backcasting enables you to answer the question, “What energy loads would have been predicted had I known the actual weather?”

In more detail, backcasting is the process of re-forecasting the dependent variable for a time period that has passed using the actual independent variable. For SAS Energy Forecasting the forecast equation used for the past hour is evaluated with the actual temperature to replicate what the forecast would have been using actual temperature. The difference between the backcast value and the actual value is model error.

To do backcasting, you must update your input weather table by replacing the predicted weather with the actual weather for the period to re-forecast (backcast). For more information, see “[Weather Data Table](#)” on page 173.

Note: Backcasting is not supported for a multi-zone diagnose.

SAS Energy Forecasting provides two ways to start backcasting:

- “[Auto-Backcast](#)” on page 88
- “[Manual Backcasting](#)” on page 90

Auto-Backcast

Overview

Auto-backcasting is when backcasting is done automatically each time a new event-enabled forecast is run. An event-enabled forecast occurs when the macro %SEFDATAE is run. Each time a new event-enabled forecast is run, backcasting is done automatically on a previously run forecast. (For information, see [Appendix 2, “Run an Event-Triggered Forecast,”](#) on page 211).

The backcasting that is done depends on the type of forecast that is run: very short-term or short-term.

The following figures explain what happens when you auto-backcast.

1. In this figure, it is assumed that SAS Energy Forecasting has just received a signal to run an event-triggered forecast. You can see that one forecast has already been run successfully.

The figure shows two overlapping dialog boxes for defining forecast parameters. The left dialog is titled 'New Definition - Very Short Term - Parameters' and the right is 'New Definition - Short Term - Parameters'. Both have tabs for 'Main', 'Report Data', and 'System'. In the 'Main' tab, the 'Auto-Backcast' option is checked and set to 'Yes', which is circled in red in both screenshots. Other parameters like 'Zone' (Connecticut(CT)), 'Historical Start Date', and 'Forecast Length' are also visible.

2. In this figure, you can see that the event-triggered forecast has just started running.

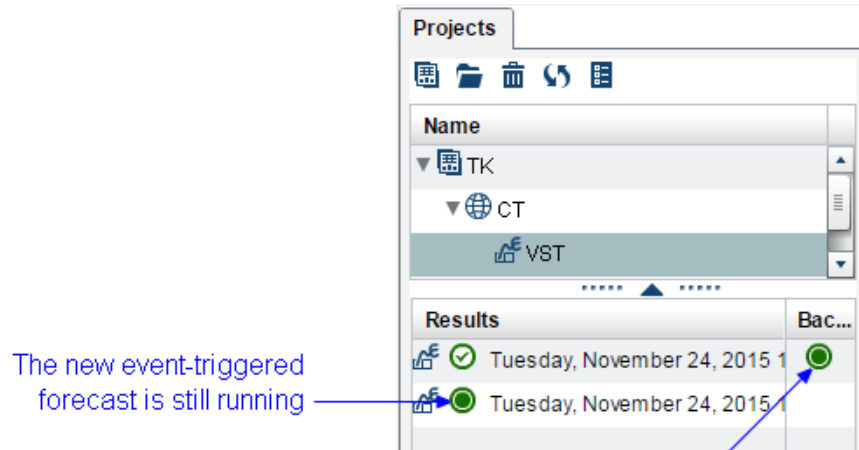
The figure shows the 'Projects' window in SAS Energy Forecasting. The tree view shows a hierarchy: TK > CT > VST. Below the tree, the 'Results' table is visible. The table has columns for 'Results' and 'Bac...'. The first row shows a forecast for 'Tuesday, November 24, 2015' with a green checkmark icon. A blue arrow points from the text 'A new event-triggered forecast starts running' to this row.

Results	Bac...
✓ Tuesday, November 24, 2015 1	
🔄 Tuesday, November 24, 2015 1	

For more information, see “Status Icons” on page 37.

Note: An event-triggered forecast occurs when the macro %SEFDATAE is run. For more information, see Appendix 2, “Run an Event-Triggered Forecast,” on page 211.

- In this figure, you can see that in addition to the event-triggered forecast, an auto-backcast has also started running.

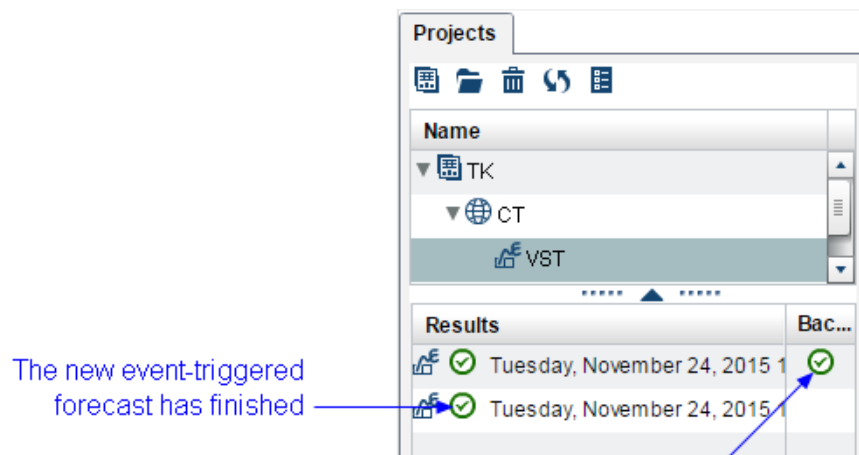


An auto-backcast is also running

Note that the auto-backcast is run on a forecast that completed previously

Notice that the backcast is being run on the forecast that had finished running previously and not on the event-triggered forecast that is running concurrently with the backcast.

- In this figure, you can see that the two processes have finished running:



- The event-triggered forecast (triggered by a message from the %SEFDATAE macro)
 - The auto-backcast that is run on a forecast that has previously completed
- To see the results of the backcast, right-click the forecast that was backcasted, select **Open**, and then review the BCST_RESULTS file.

Very Short-Term Forecast

Backcasting is performed for the hour previous to the start hour of the new very short-term forecast (assuming that the hour previous to the new start hour has already been predicted).

Note:

- If the forecast being run is the very first one to be run, then there is no forecast prior to it to be backcast, so in this case, no backcasting occurs. Once the forecast finishes running, you can backcast it manually. For more information, see [“Manual Backcasting” on page 90](#).
- If the previous hour was not successfully predicted (because of an error or otherwise), then SAS Energy Forecasting searches forecast instances that have already been run for one containing the most recent prior hour that was predicted and backcasts it.

Short-Term Forecast

For a short-term forecast, backcasting is performed for the day previous to the start day of the new short-term forecast (assuming that the day previous to the new start day has already been predicted). Backcasting is done for every hour of the previous day.

Note:

- If the forecast being run is the very first one to be run, then there is no forecast prior to it to be backcast, so in this case, no backcasting occurs. Once the forecast finishes running, you can backcast it manually. For more information, see [“Manual Backcasting” on page 90](#).
- If the previous day was not successfully predicted (because of an error or otherwise), then SAS Energy Forecasting searches forecast instances that have already been run for one containing the most recent prior day that was predicted and backcasts it.

See Also

[“BCST_RESULTS Table” on page 284](#)

Manual Backcasting

Overview

Manual backcasting is when you manually update your input weather table by replacing the predicted weather with the actual weather for the period to be re-forecasted (backcast).

You can run manual backcasting for a very short-term forecast or a short-term forecast.

See Also

[“Weather Data Table” on page 173](#)

Very Short-Term Forecast

Backcasting is performed for the hour previous to the start hour of the very short-term forecast (assuming that the hour previous to the forecast start hour has already been predicted).

Note: If the previous hour was not successfully predicted (because of an error or otherwise), then SAS Energy Forecasting searches forecast instances that have already been run for one containing the most recent prior hour that was predicted and backcasts it.

Short-Term Forecast

Backcasting is performed for the day previous to the start day of the short-term forecast (assuming that the day previous to the forecast start day has already been predicted). Backcasting is done for every hour of the previous day.

Note: If the previous day was not successfully predicted (because of an error or otherwise), then SAS Energy Forecasting searches forecast instances that have already been run for one containing the most recent prior day that was predicted and backcasts it.

Run Backcasting for a Forecast That has Already Been Run

1. Select a forecast definition.
2. Right-click a forecast instance for that definition.
Note: The forecast instance must have completed successfully.
3. Select **Backcast**.
An icon indicates that the backcast is processing.
Another icon indicates that the backcast has finished successfully.
4. Open the forecast instance (the same forecast instance for which you selected **Backcast**).
5. View the BCST_RESULTS file to see the results of the backcast.

See Also


- [“Status Icons” on page 37](#)
- [“BCST_RESULTS Table” on page 284](#)

Chapter 17

Forecasting a Geographical Hierarchy

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Create or Edit a Reconciliation Definition

1. To create a reconciliation definition:
 - a. Right-click a project, and select **New** ⇨ **Reconciliation**.
The New Definition - Reconciliation wizard appears.
 - b. Enter a name.
 - c. Click .
The Select Zone window appears.
 - d. Select a parent zone, and then click **OK**.
 - e. Continue with [Step 3](#).
2. To edit a reconciliation definition, right-click a successful reconciliation instance, and select **Edit**.
The Reconciliation wizard appears.
3. (Optional) Enter a description.
4. Select a **Reconciliation Method Type**.
For more information, see [“Reconciliation Method Type”](#) on page 24.

For detailed information, see Chapter 13: The HPFRECONCILE Procedure in *SAS Forecast Server Procedures 14.1 User's Guide* at <http://support.sas.com/documentation/onlinedoc/forecast/index.html>.

- If you selected top-down reconciliation, select a **Disaggregation** method to control how the aggregation error is apportioned.

For more information, see “[Disaggregation](#)” on page 25.

- Select the forecast type.
- If you selected **Medium/Long Term** as the forecast type, select the model and enter the economic scenario to use for reconciliation.

Note: Medium- and long-term forecasts can contain results for multiple models and scenarios. You must decide which model and scenario to use before running a reconciliation.


- (Optional) Click the **System** tab, and then specify the system parameters.



Note: The **System** tab is displayed only if you have selected **Show System Parameters**. For more information, see “[Overview of SAS Energy Forecasting User Preferences](#)” on page 209.

For more information, see “[System Parameters](#)” on page 25.

- Click **Next**.

The **Forecasts** page appears.

- Select a forecast definition for every node in the zone's hierarchy by clicking ,

, or  in the **Forecast Definition** column.

Note: All forecast definitions must be in the same project. And, the forecast horizon (the time span from the forecast start date to the forecast end date) must be the same for all forecast results to reconcile. You can run a reconciliation on short-term or very short-term forecasts.

- Click **Finish**.

A new reconcile definition is created.

See Also

- Chapter 5, “[Reconciliation Definitions](#),” on page 23
- “[Reconciliation Parameters](#)” on page 268

Run a Reconciliation Definition

Right-click a reconciliation definition, and select **Run**.

A reconciliation instance is created and begins to run.

See Also

- “[Status Icons](#)” on page 37
- “[Reconciliation Parameters](#)” on page 268

View the Reconciliation Results


1. Select a successful reconciliation.
2. In the bottom pane, right-click a results file, and select **Open**.
3. View the REC_HIER_RESULTS and REC_RESULTS files.

The REC_HIER_RESULTS table shows the entire geographical hierarchy for which the reconciliation job was run.

See Also

- [“REC_HIER_RESULTS” on page 286](#)
- [“REC_RESULTS” on page 287](#)

Create or Edit a Multi-Zone Diagnose Definition

1. Click the **Projects** tab.
2. To create a multi-zone diagnose definition:
 - a. Right-click the project name, and select **New** ⇒ **Multi-Zone Diagnose**.
The New Definition window appears.
 - b. Enter the name.
 - c. Click , select the diagnosis/forecasting location from the hierarchy, and click **OK**.
 - d. Continue with [Step 4](#).
3. To edit a multi-zone diagnose definition, right-click the diagnose definition, and select **Edit**.

The Diagnose - Parameters window appears.

For more information, see [“Lock Icon” on page 38](#).

4. (Optional) Enter the description.
5. Specify the parameters, and then click **Save**.

For more information, see [“Diagnose Definition Parameters” on page 16](#).

Note: The **System** tab might be hidden. Whether it is visible or not depends on the **Show System Parameters** preference setting. For more information, see [“Overview of SAS Energy Forecasting User Preferences” on page 209](#).

See Also

- [Chapter 3, “Diagnose Definitions,” on page 15](#)
- [Appendix 5, “Parameters,” on page 251](#)

- [“Multi-Zone Diagnose Definitions”](#) on page 18

Create Multi-Zone Forecast Definitions

1. On the **Projects** tab, right-click the multi-zone diagnose definition, and select **New Forecast Definitions**.

The New Forecast Definitions wizard appears.

2. Enter the name prefix and (optional) description.
3. Click **Next**.

The Forecast Parameters page appears.

4. Specify the type of forecast.
5. Specify the parameters.

For more information, see [“Forecast Definition Parameters”](#) on page 19.

Note: The parameters that are available depend on the type of forecast and your specifications.

6. Click **Next**.

The Forecast Model page appears.

7. Specify the forecast model to use and other parameters, and then click **Finish**.

A forecast definition is created for each zone.

See Also

- Chapter 4, “Forecast Definitions,” on page 19
- [“Multi-Zone Forecast Definitions”](#) on page 21
- Chapter 15, “Working with Forecasts,” on page 83
- [“Very Short-Term Forecasting Parameters”](#) on page 258
- [“Short-Term Forecasting Parameters”](#) on page 260
- [“Medium-Term/Long-Term Forecasting Parameters”](#) on page 263

Edit a Multi-Zone Forecast Definition

Editing a multi-zone forecast definition is the same as editing a standard forecast definition. For more information, see [“Create or Edit a Forecast Definition”](#) on page 29.

Delete All Forecast Definitions in a Multi-Zone Diagnose Definition

On the **Projects** tab, right-click the multi-zone diagnose definition, and select **Delete All Forecast Definitions**.

Run All Forecast Definitions in a Multi-Zone Diagnose Definition

On the **Projects** tab, right-click the multi-zone diagnose definition, and select **Run All Forecast Definitions**.

Note:

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Viewing the Results

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Modifying a View by Customizing the Query

Overview

You can specify a custom query whose results are displayed as a graph and table.

Here are the parameters:

- **Page size:** The amount of data that is retrieved from the database at one time.
You can experiment with page size, but be careful about asking the system to query more data than your hardware can handle.
Note: Too large a page size can result in the system timing out. If the system becomes unresponsive during a query, press Esc to cancel the current query. Then, reduce the page size.
- **Date filter:** The beginning date and end date of the results to display.
Note: To not filter by date, specify **None**.
- **Group by:** The variable for the X axis.

One point is displayed on the X axis for each distinct value of this variable. For example, if you specify year as the variable to group by, then one point is displayed on the X axis for each calendar year even if there are multiple rows in the database table for the same year. For example, there might be database rows for every day in a year, but only one point would be displayed on the X axis if you group by year.

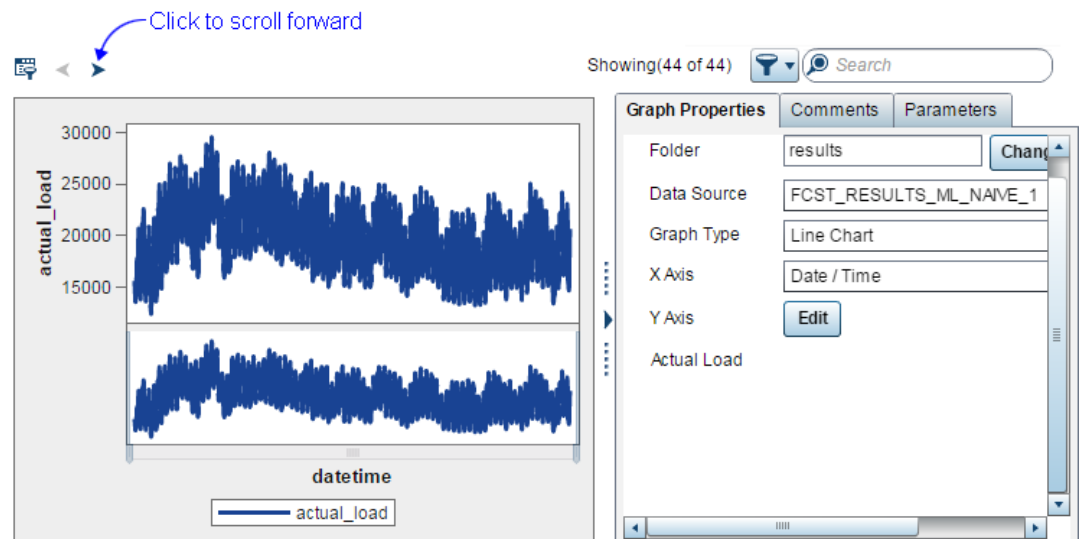
- Column name: One or more variables for the Y axis.

Because, with the group by variable, every point on the X axis corresponds to multiple rows in the database, you must specify how to aggregate these rows to display a single point on the Y axis. You can specify SUM, AVG, MIN, or MAX.

Example

This figure shows the graph that results from having selected date/time for the X axis and actual_load for the Y axis.

Figure 18.1 Example Graph



You can see that because date/time includes an enormous number of rows (one for every point in time at which a load value is obtained), the X axis is crowded with so much data that not all of it fits in the window. You can see that the scroll button is enabled to scroll forward.

This figure shows a custom query that minimizes the amount of data displayed in a single graph:

Figure 18.2 Example Custom Query

Query Specification Window

Page Size: 10000

Date Filter: None

Advanced

Group By: year

Column Name	SUM	AVG	MIN	MAX
Actual Load	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Absolute Error	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Absolute Percentage Error	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Datetime	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Error	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Predicted Load	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

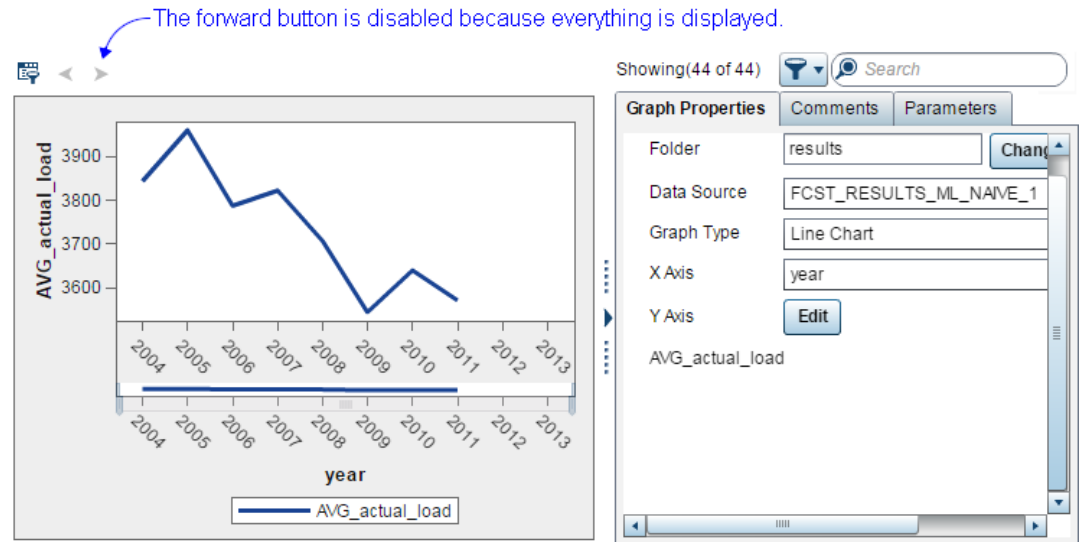
OK Cancel

Notice these settings:

- The value for **Page Size** is not changed from the default value.
- The value for **Group By** is **year**, which is chosen for the X axis instead of date/time. The result of choosing year is that instead of displaying one point on the X axis for every point in time at which a load value is obtained, only one point is displayed on the X axis for every year. That is, all the rows for a single year are grouped together and displayed on the graph as a single point.
- The value for **Column Name** is **AVG**. For each year on the X axis, the average load is displayed for all the date/time load observations taken during that year.

This figure shows the results of the custom query:

Figure 18.3 Results of Example Custom Query



You can see that instead of one point on the X axis for every date/time load observation, there is only one point on the X axis per year. For each year, the average load during that year is displayed on the Y axis. And, you can see that because the number of years represented in the database is able to be displayed in a single graph, the scroll button is disabled.

You can also see that in place of the values chosen for the initial display, the values chosen for the custom query are now displayed under **Graph Properties**, namely:

- **X Axis:** year
- **Y Axis:** AVG_actual_load

See Also

“Modify the View by Customizing the Query” on page 103

View a Table or Graph

1. Select a diagnose definition or forecast definition.
2. Right-click a result instance associated with that definition and select **Open**.
A results data set is displayed both in the form of a table and a graph.

See Also

- “Very Short-Term Forecast Results” on page 279
- “Short-Term Forecast Results” on page 280
- “Point Forecast Results” on page 281
- “Probabilistic Forecast Results” on page 283

View Another Data Set

1. On the **Graph Properties** tab, select a folder.
2. To select a data set from a different folder, click **Change Folder**, and then select the data set.

The input data is in the **Sources** folder.

Note: If you chose to delete the copied source data after the run of the diagnose or forecast, the **Sources** folder is not available.

3. Select a data set from the **Data Source** drop-down list.

See Also

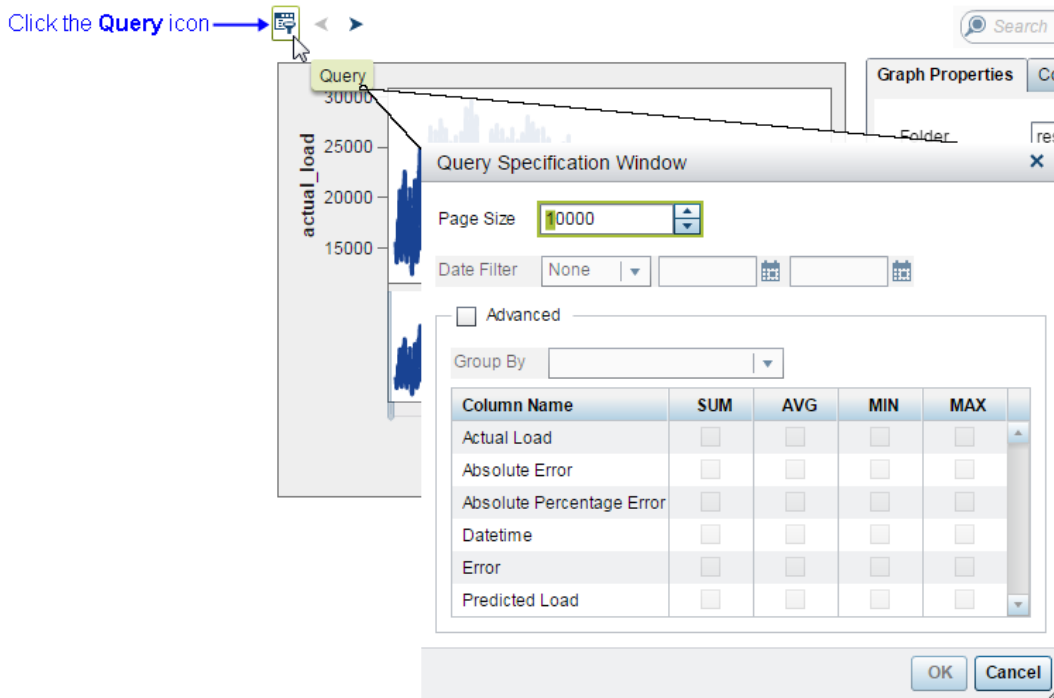
- [“Very Short-Term Forecast Results” on page 279](#)
- [“Short-Term Forecast Results” on page 280](#)
- [“Point Forecast Results” on page 281](#)
- [“Probabilistic Forecast Results” on page 283](#)

View Another Graph or Table

1. Click the plus sign next to the currently displayed table, and select **Graph** or **Table**.
The Select Graph or Select Table window appears.
2. Select the file for which you want to see a graph or table.
The graph or table is displayed in a new tab.

Modify the View by Customizing the Query

1. Click  at the top left of an open graph.



The Query Specification Window appears.

- Specify the query parameters, and then click **OK**.

See Also

“Modifying a View by Customizing the Query” on page 99

Change the Scale of the X Axis

Drag the preview bar beneath the graph. You can drag the left bar to the right or the right bar to the left.

Filter the Results

- Click .

A pop-up window appears that shows all of the fields that you can filter on.

- For each field that you want to filter on, select the values to include in the results.

Note: Filtering applies to an entirely new query. It does not apply to the graph or table already displayed. Therefore, you can select fields to filter on that are not displayed in either the X axis or the Y axis.

See Also

“Display the Properties of an Object” on page 44

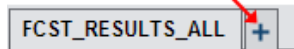
Add Comments to the Output of a Diagnose or Forecast

1. View the results of a diagnose or forecast.
For more information, see [“View a Table or Graph”](#) on page 102.
2. Click the **Comments** tab.
3. Enter a topic title and topic text.
You can respond to a previous comment by typing in the field labeled **Respond to topic**.
4. Click **Post**.

Note: In order to delete a comment, the user must have the SAS Application Infrastructure **Delete comments** capability. A user has this capability by being a member of a group that has a role with this capability. For more information, see [Chapter 25, “Manage Permissions,”](#) on page 175.

Run a Stored Process

1. Open a forecast or diagnose results.
2. Click the plus sign above the tabular results, and select **Stored Process**.



3. Select a stored process, and click **OK**.

Produce Reports

After running forecasts, you can produce reports to view forecast results with the SAS Visual Analytics Report Viewer, which is included with SAS Energy Forecasting.

When you create a forecast definition, you can choose to create report data tables. You can create either normalized or denormalized tables, and you can choose either SAS tables or SAP HANA data sets as output.

For more information, see [Chapter 20, “Producing Reports,”](#) on page 111.

For information about using SAS Visual Analytics, see the [SAS Visual Analytics 7.3: User’s Guide](#).

Chapter 19

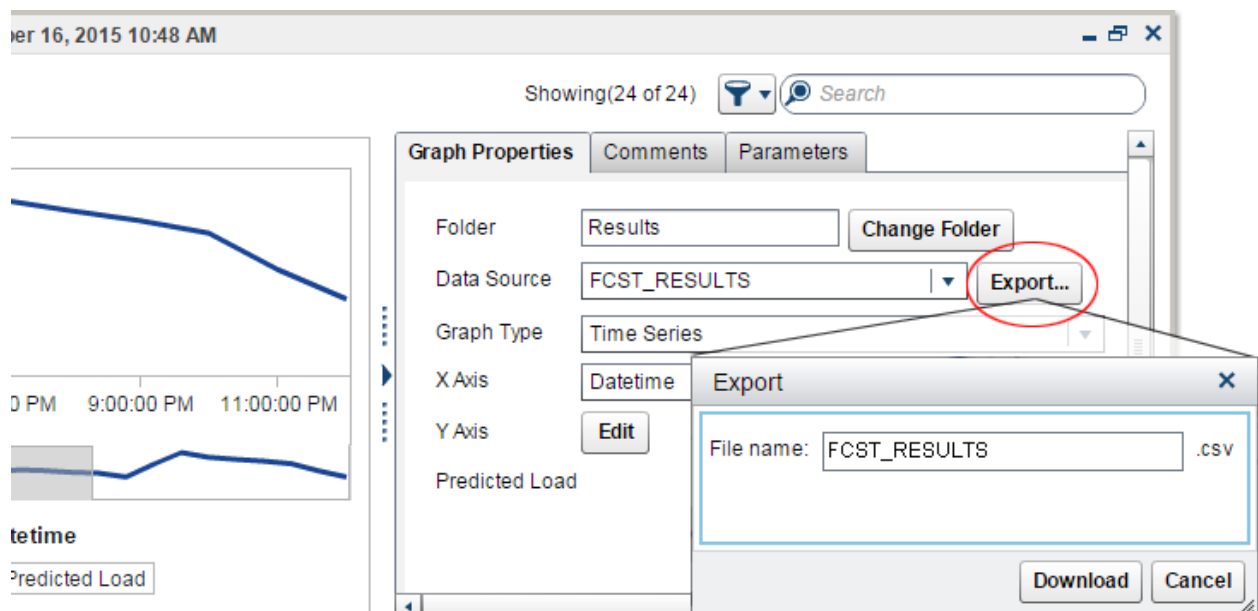
Exporting Comma-Separated Values

Export CSV 107

Export CSV

1. View the results of a diagnose or forecast. For more information, see [“View a Table or Graph”](#) on page 102.
2. Select the table to export. For more information, see [“View Another Data Set”](#) on page 103.
3. Click **Export**.

The Export window appears.



4. Enter a filename, and then click **Download**.

The Save As window appears.

5. Navigate to a location, and click **Save**.

Part 5

Reporting the Data

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Chapter 20

Producing Reports

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Overview

With SAS Energy Forecasting, you can create tables that are suitable for producing reports using SAS Visual Analytics or SAP HANA or another report tool. When you create a new forecast, you select the type of report output that you want.

Here are the types:

- SAS
Report data is create as SAS data sets.
- HANA
Report data is create as SAP HANA tables.
- None
No report data is produced.

Report data is written to the rptdata folder. For more information, see [“Report Data” on page 154](#).

For information about using SAS Visual Analytics, see the [SAS Visual Analytics 7.3: User’s Guide](#).

Here are the types of table outputs:

- Normalized tables
If you select normalized output, then you get more (but smaller) tables without redundant data than you do with denormalized output where you get fewer (but larger) tables with redundant data. Normalized tables require you to do joins on the tables for reporting.

Note: If you select HANA for the report output, then the tables are automatically normalized.

- Denormalized data sets

If you select denormalized output, then you get fewer (but larger) tables with redundant data than you do with normalized output where you get more (but smaller) tables without redundant data.

Denormalized tables are created as SAS data sets.

TIP If you create denormalized tables, the storage required can become very large. Make sure that you periodically purge these data sets to free up space.

See Also

[Chapter 21, “Normalized Tables and Denormalized SAS Data Sets,” on page 123](#)

Sample Reports

Overview

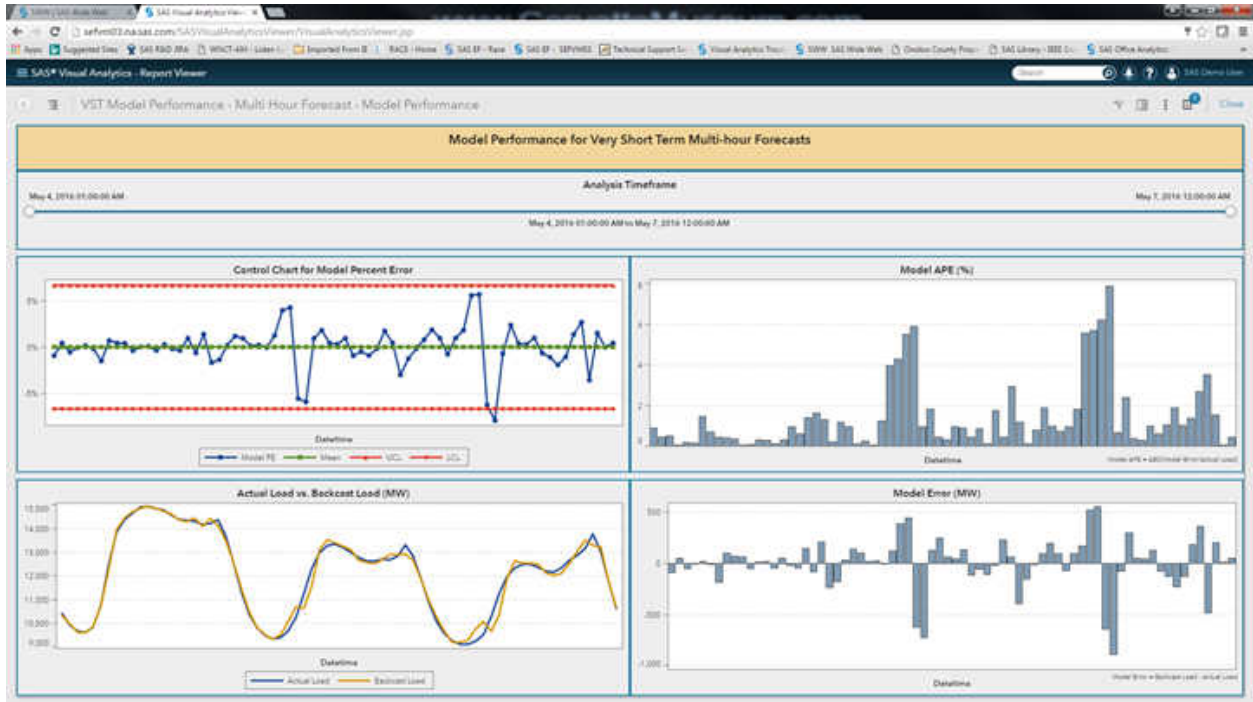
In addition to providing sample input data that you can use to quickly produce energy forecasts, SAS Energy Forecasting includes sample report data that you can view with the SAS Visual Analytics Report Viewer, which comes with SAS Energy Forecasting.

The data files associated with the sample reports are not visible within SAS Energy Forecasting but are based on the sample input data provided with the solution. You can use the SAS Visual Analytics Administration and Reporting solution provided with SAS Energy Forecasting to access and modify the data files and associated queries as needed to produce other types of reports.

Very Short-Term Forecasts

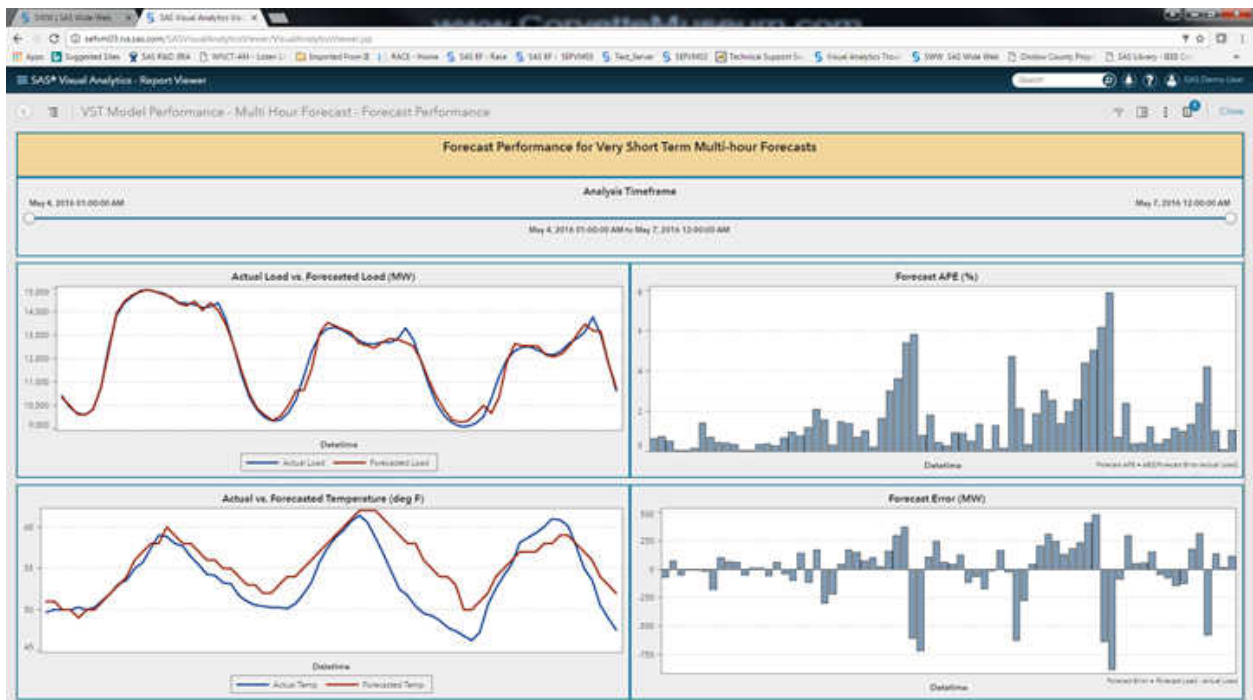
- Model Performance for Very Short-Term Multi-Hour Forecasts

Figure 20.1 Model Performance for Very Short-Term Multi-Hour Forecasts



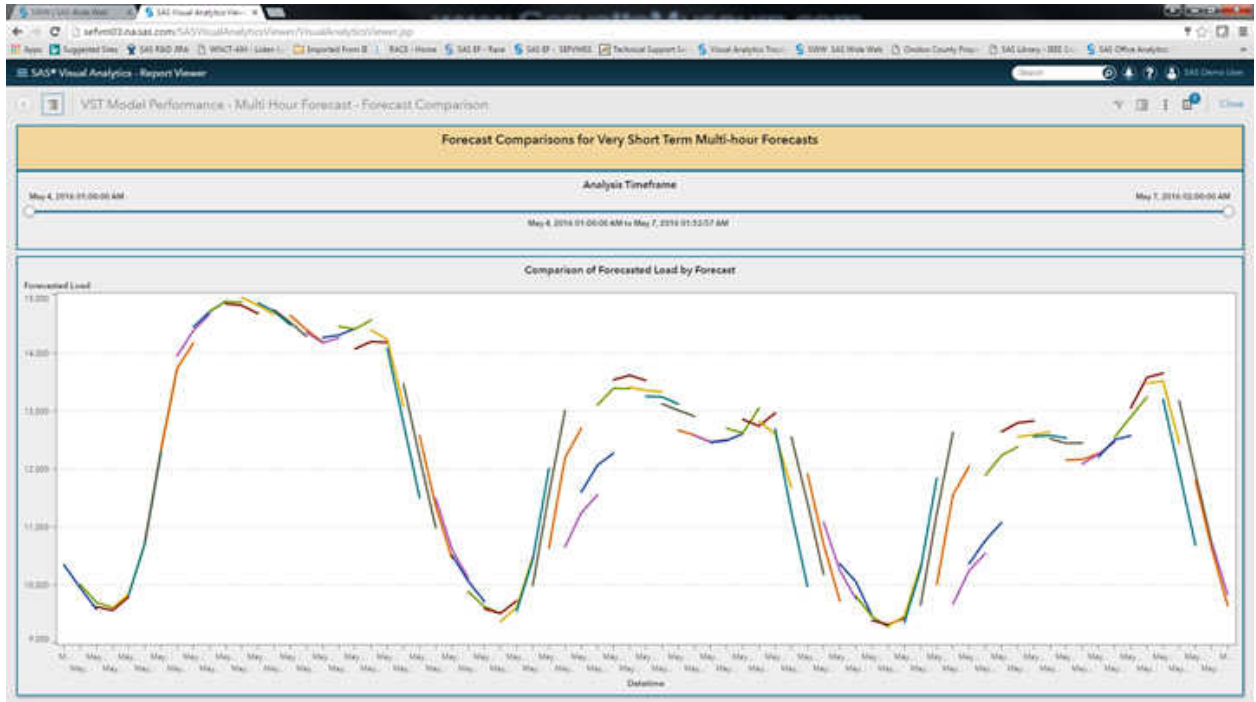
- Forecast Performance for Very Short-Term Multi-Hour Forecasts

Figure 20.2 Forecast Performance for Very Short-Term Multi-Hour Forecasts



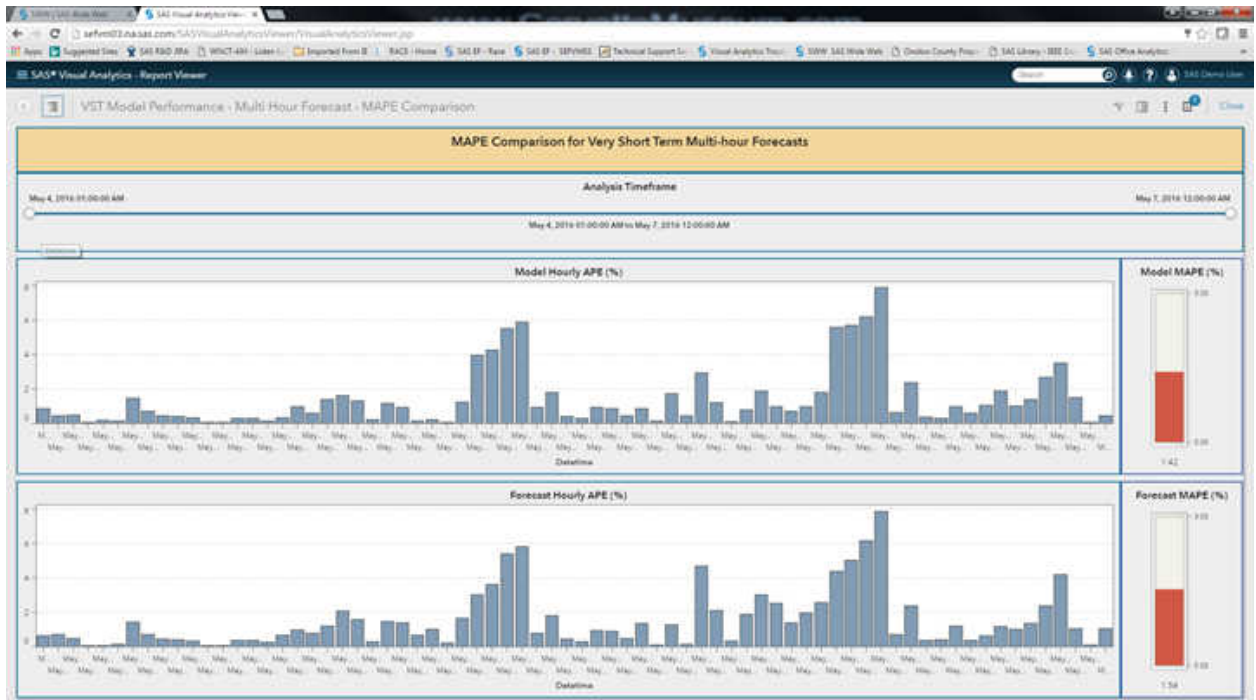
- Forecast Comparisons for Very Short-Term Multi-Hour Forecasts

Figure 20.3 Forecast Comparisons for Very Short-Term Multi-Hour Forecasts



- MAPE Comparisons for Very Short-Term Multi-Hour Forecasts

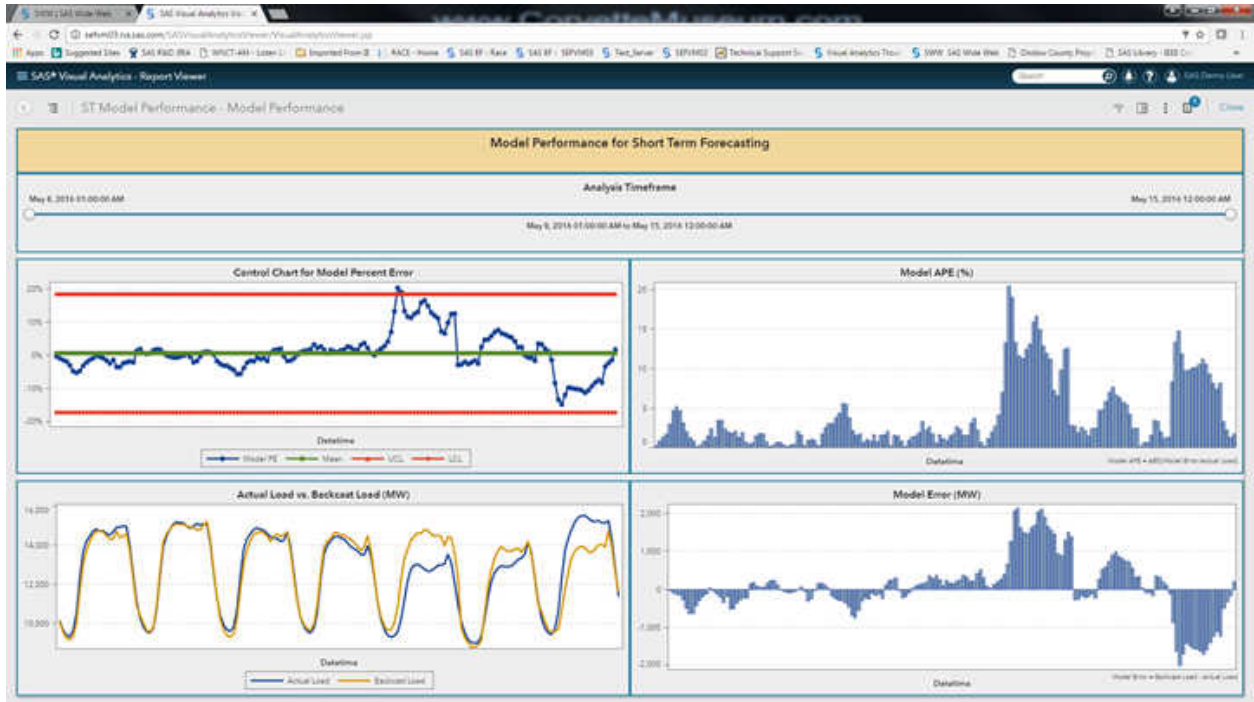
Figure 20.4 MAPE Comparisons for Very Short-Term Multi-Hour Forecasts



Short-Term Forecasts

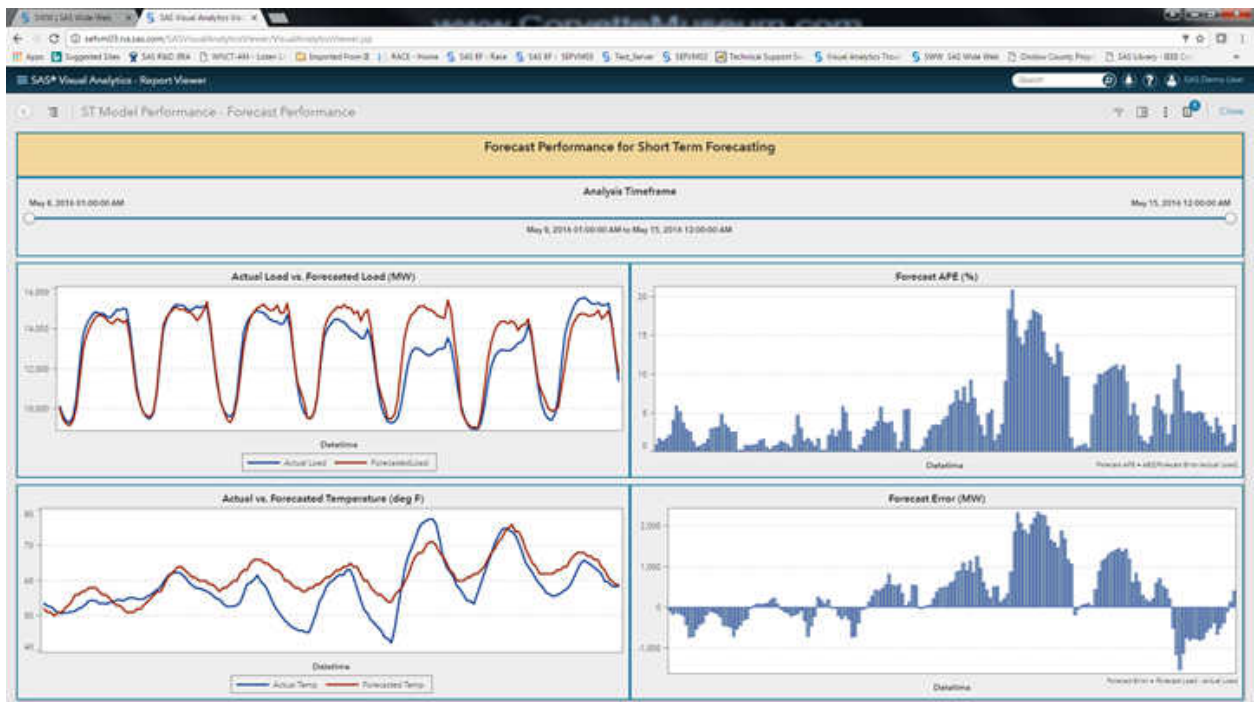
- Model Performance for Short-Term Forecasting

Figure 20.5 Model Performance for Short-Term Forecasting



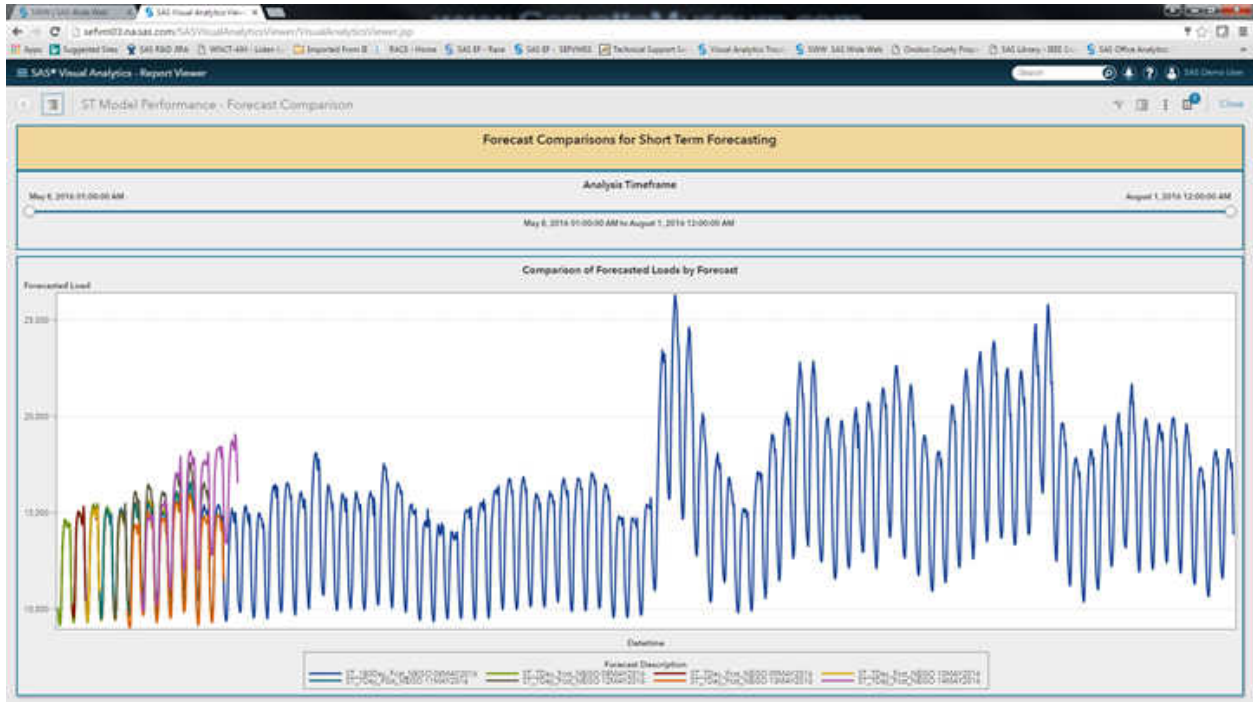
- Forecast Performance for Short-Term Forecasting

Figure 20.6 Forecast Performance for Short-Term Forecasting



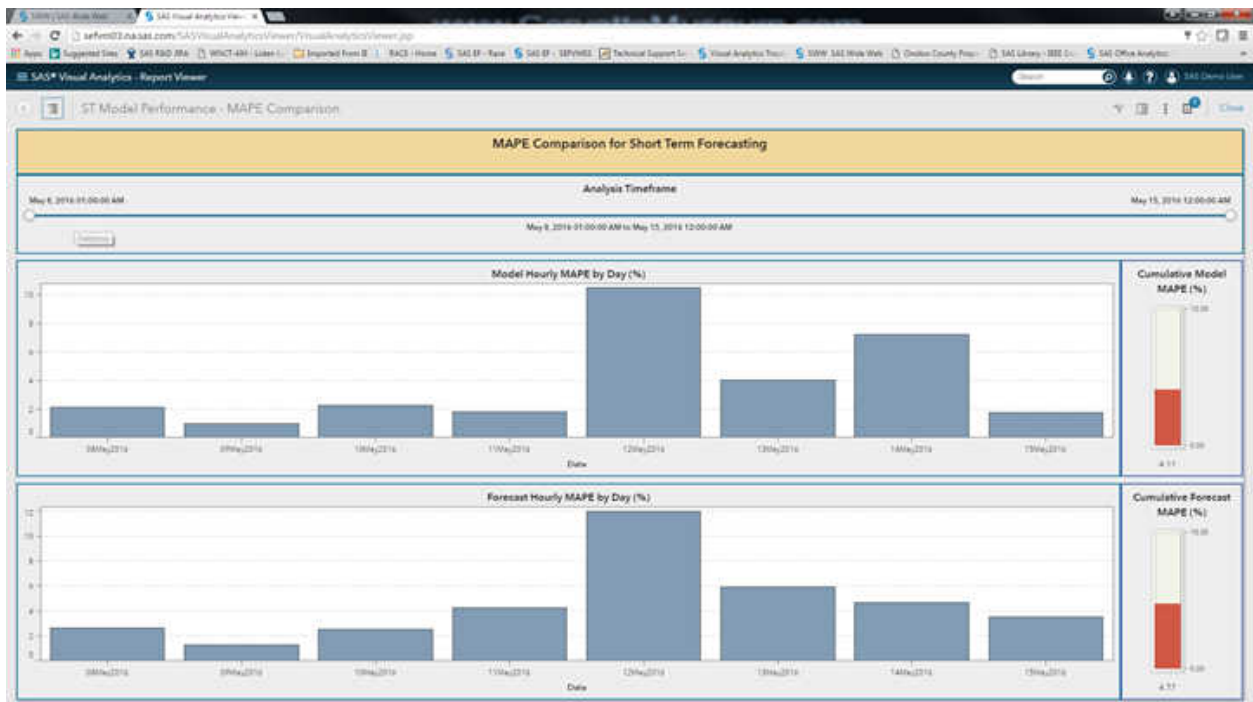
- Forecast Comparisons for Short-Term Forecasting

Figure 20.7 Forecast Comparisons for Short-Term Forecasting



- MAPE Comparison for Short-Term Forecasting

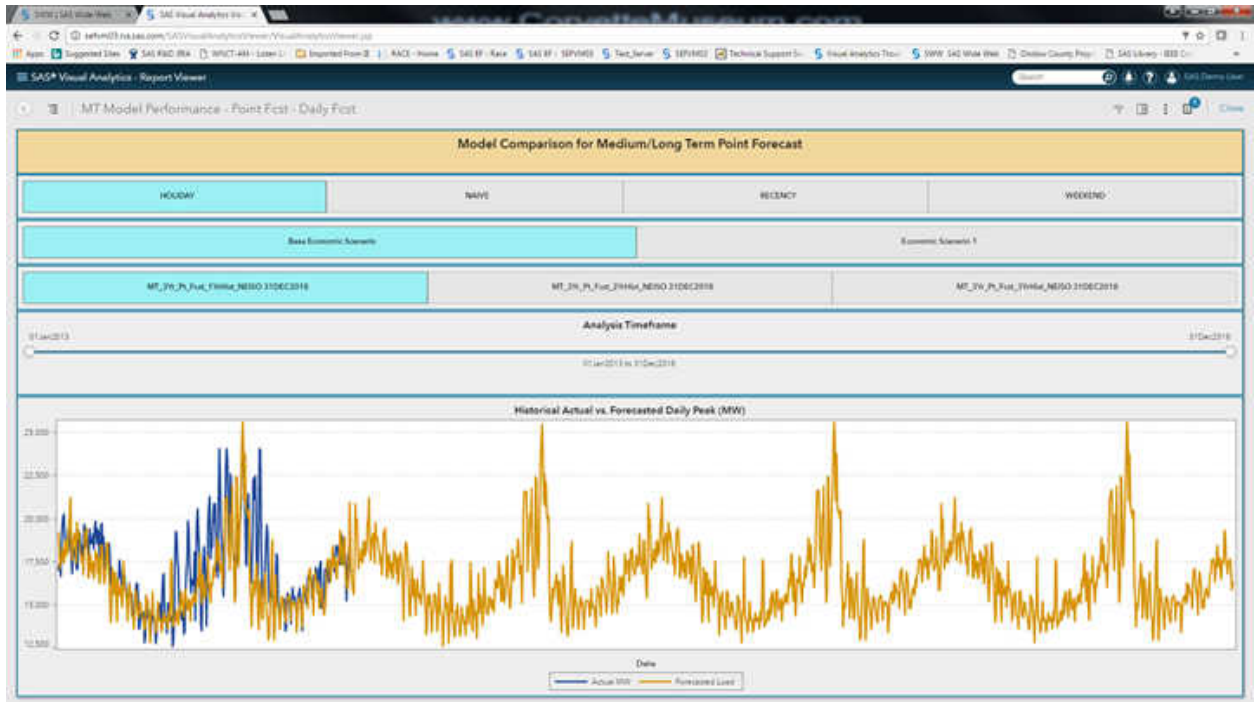
Figure 20.8 MAPE Comparison for Short-Term Forecasting



Medium/Long-Term Forecasts

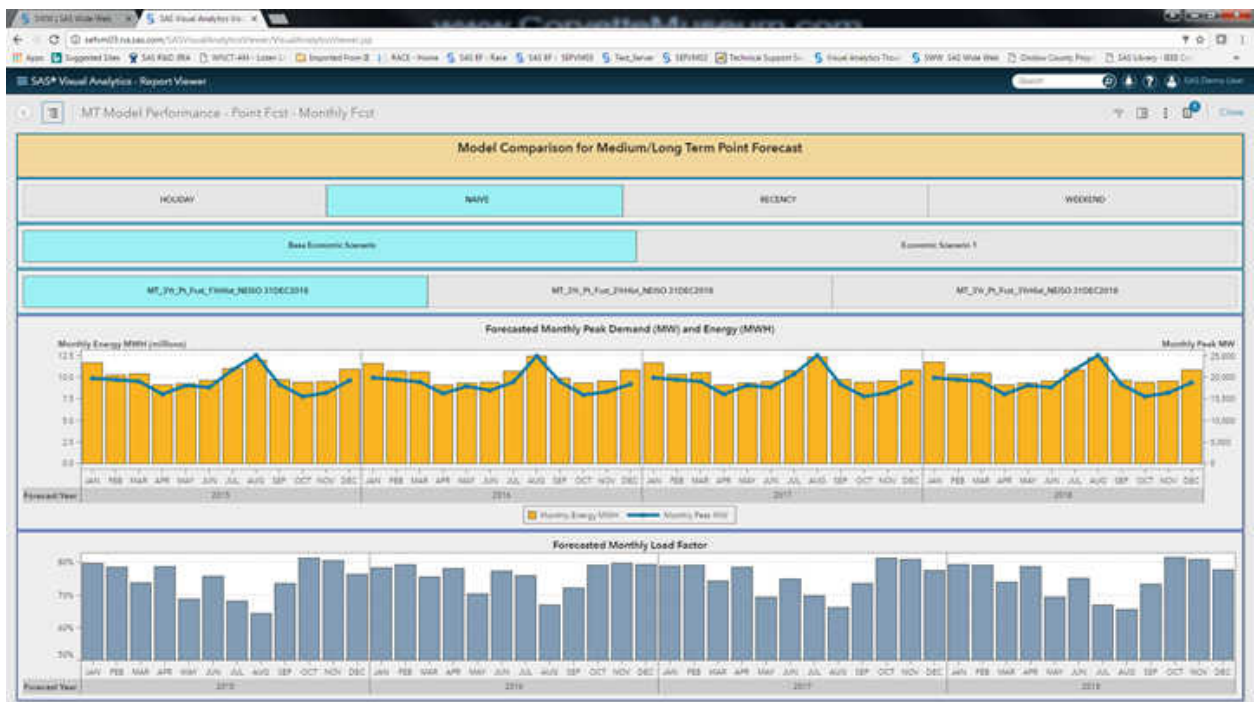
- Model Comparison for Medium/Long-Term Point Forecasting – Historical Actual vs. Forecasted Daily Peak (MW)

Figure 20.9 Model Comparison for Medium/Long-Term Point Forecasting – Historical Actual vs. Forecasted Daily Peak (MW)



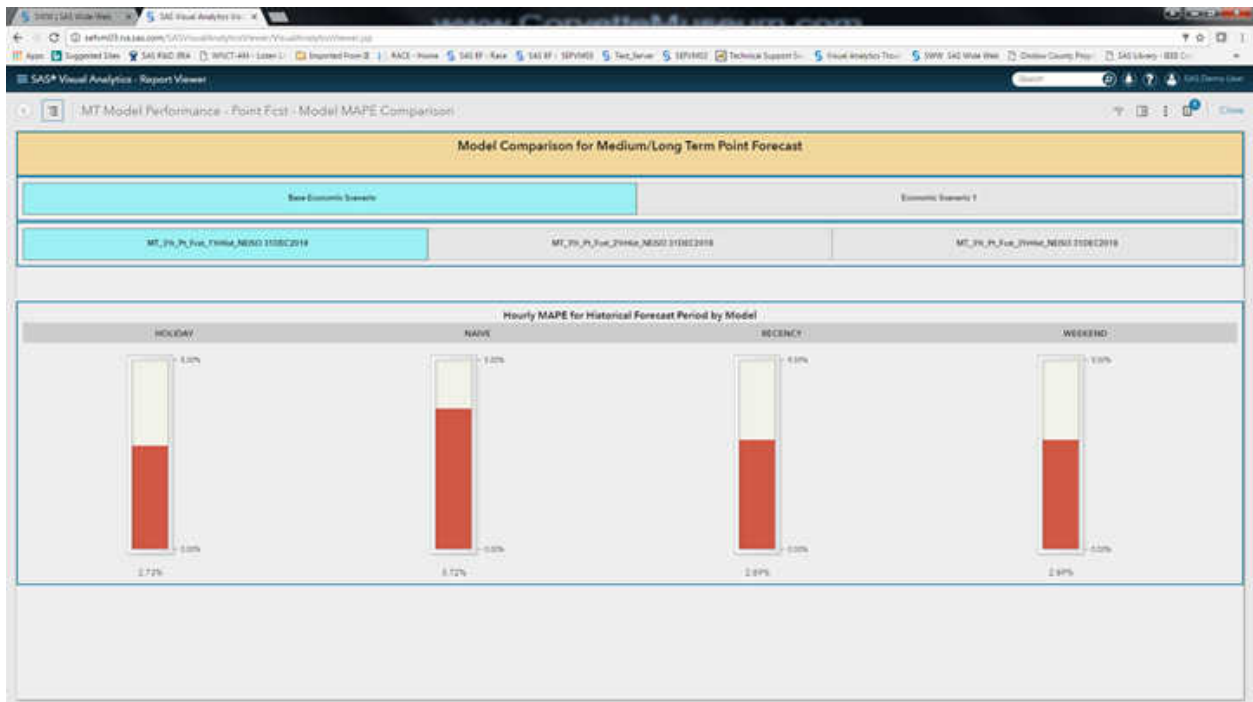
- Model Comparison for Medium/Long-Term Point Forecasting – Forecasted Monthly Peak Demand (MW) and Energy (MWH)

Figure 20.10 Model Comparison for Medium/Long-Term Point Forecasting – Forecasted Monthly Peak Demand (MW) and Energy (MWH)



- Model Comparison for Medium/Long-Term Point Forecasting – Hourly MAPE for Historical Forecast Period by Model

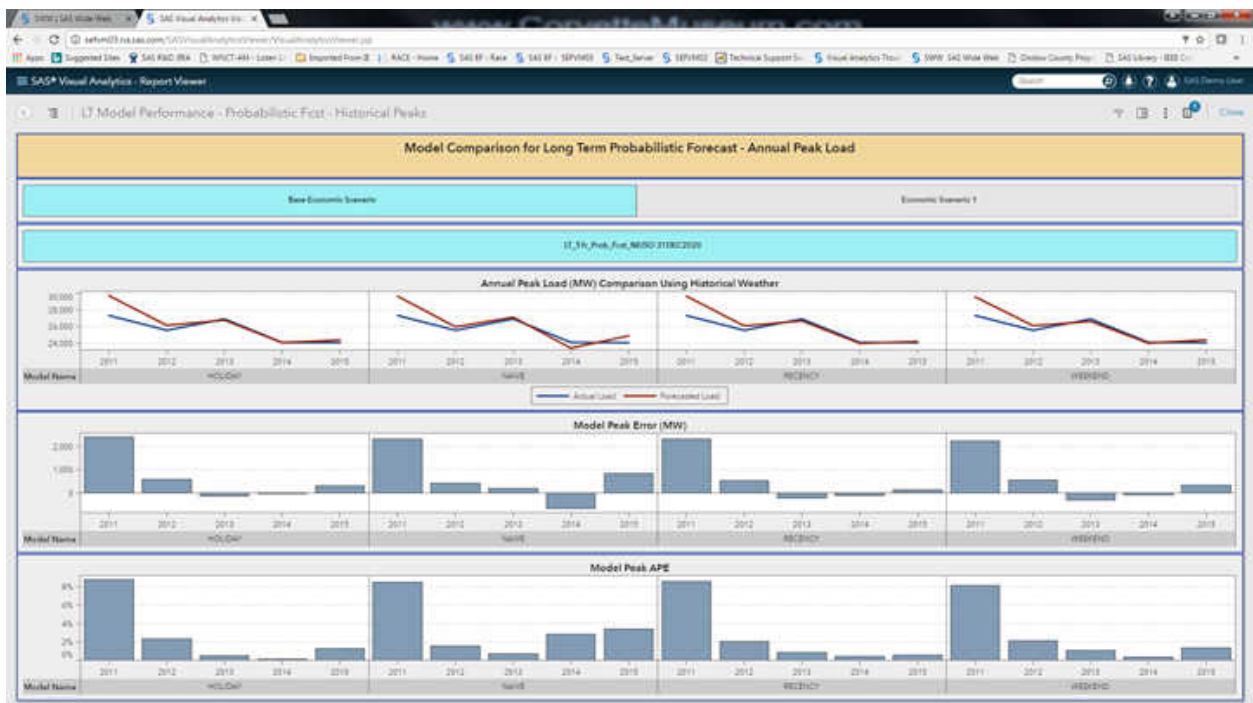
Figure 20.11 Model Comparison for Medium/Long-Term Point Forecasting – Hourly MAPE for Historical Forecast Period by Model



Long-Term Forecasts

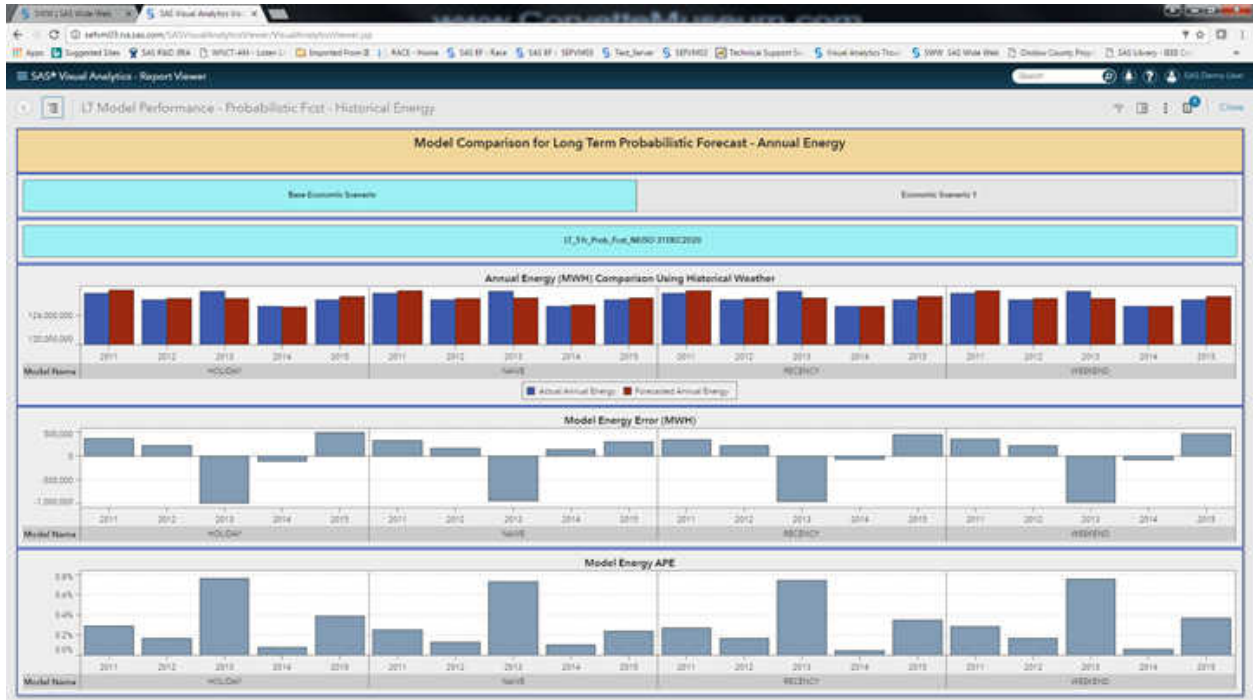
- Model Comparison for Long-Term Probabilistic Forecast – Annual Peak Load

Figure 20.12 Model Comparison for Long-Term Probabilistic Forecast – Annual Peak Load



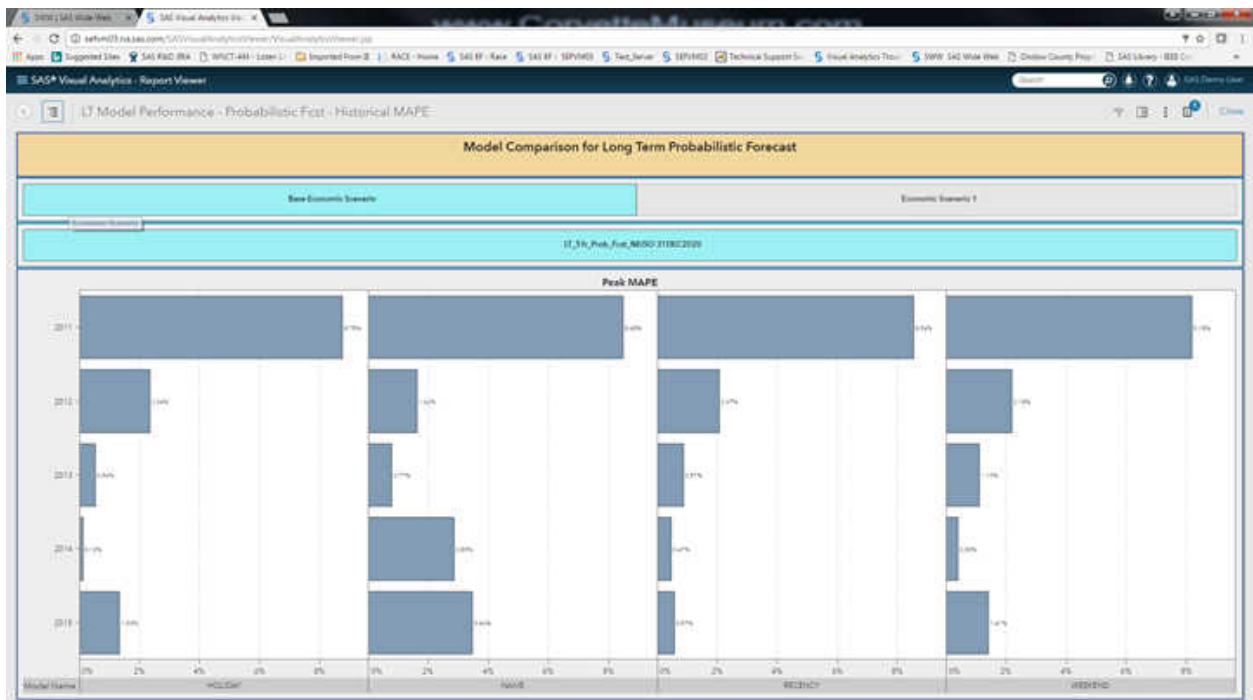
- Model Comparison for Long-Term Probabilistic Forecast – Annual Energy

Figure 20.13 Model Comparison for Long-Term Probabilistic Forecast – Annual Energy



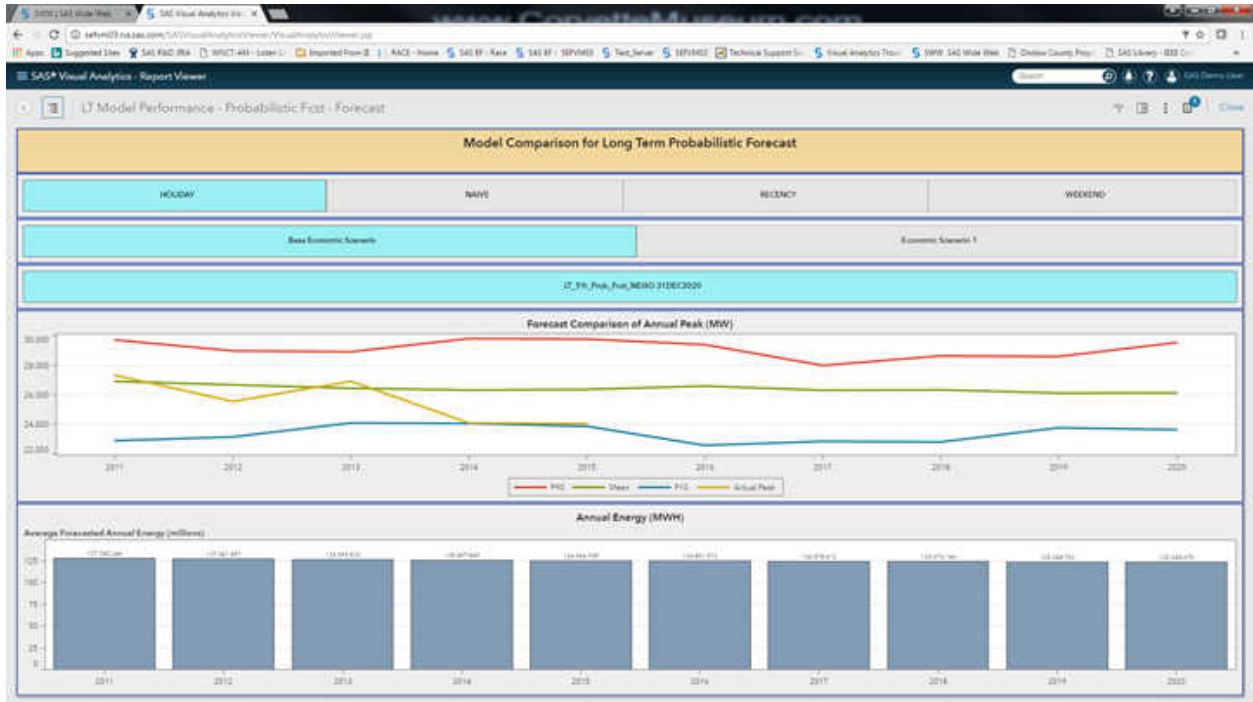
- Model Comparison for Long-Term Probabilistic Forecast – Peak MAPE

Figure 20.14 Model Comparison for Long-Term Probabilistic Forecast – Peak MAPE



- Model Comparison for Long-Term Probabilistic Forecast – Annual MAPE

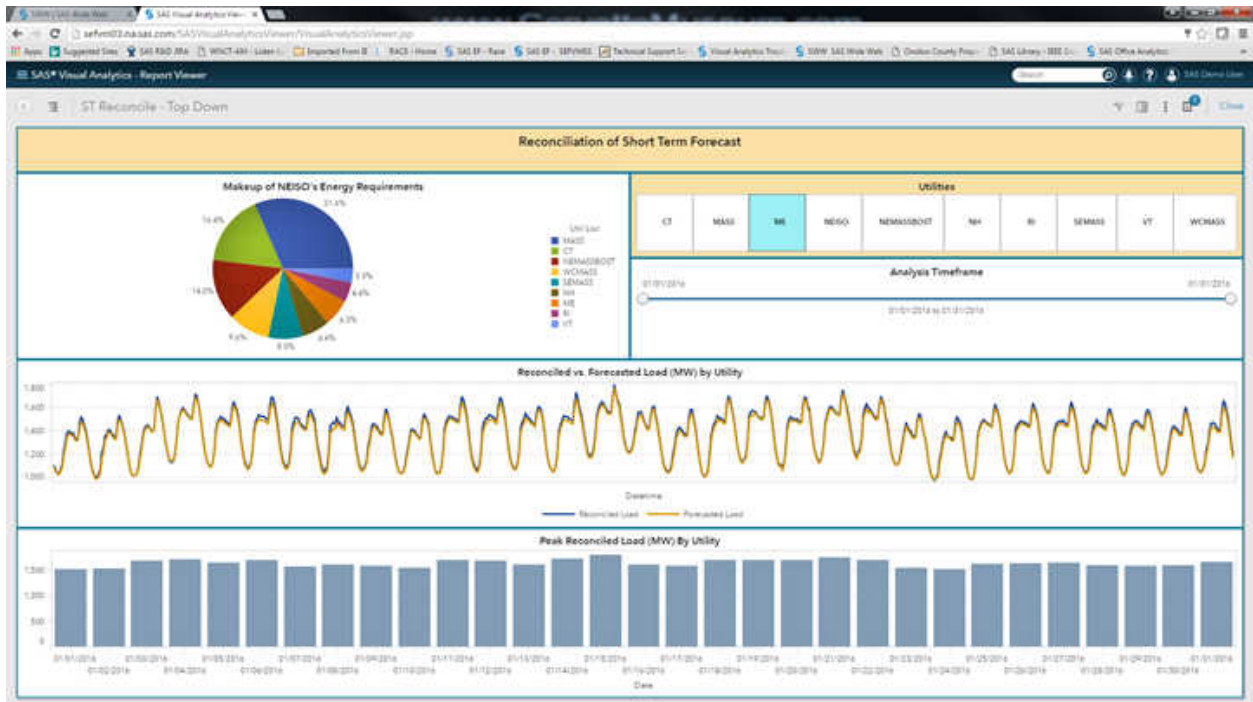
Figure 20.15 Model Comparison for Long-Term Probabilistic Forecast – Annual MAPE



Short-Term Reconciliation

- Reconciliation of Short-Term Forecast – Top Down

Figure 20.16 Reconciliation of Short-Term Forecast – Top Down



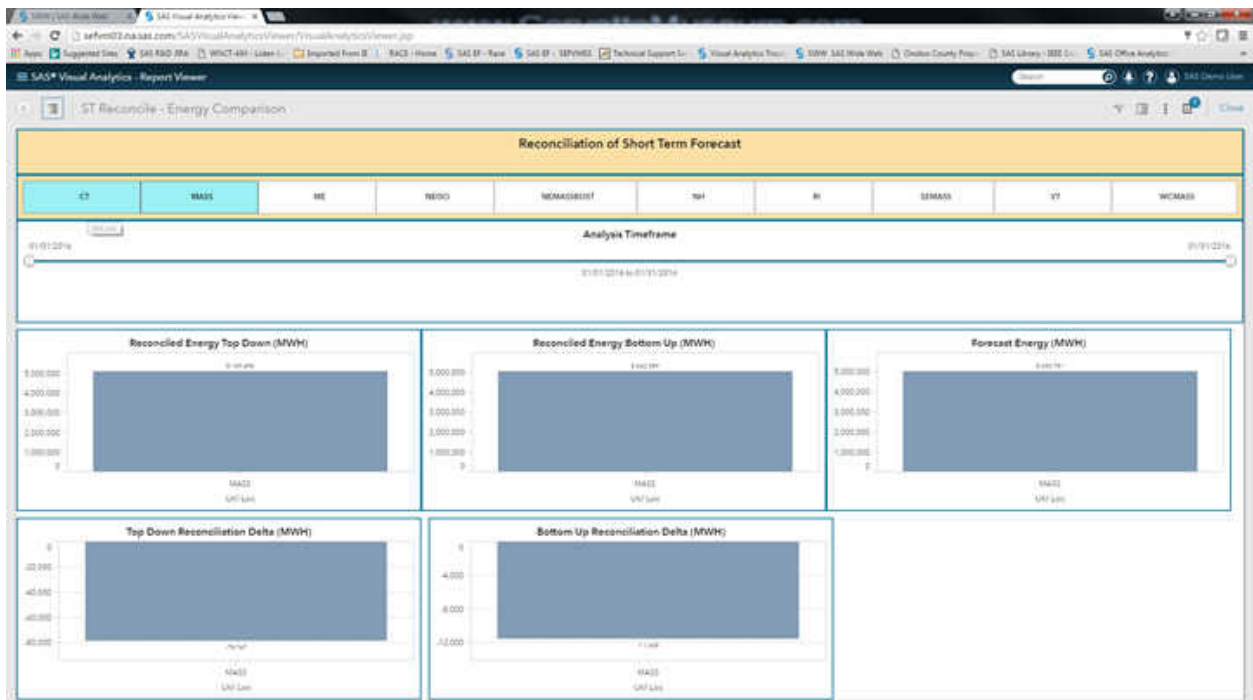
- Reconciliation of Short-Term Forecast – Bottom Up

Figure 20.17 Reconciliation of Short-Term Forecast – Bottom Up



- Reconciliation of Short-Term Forecast – Energy Comparison

Figure 20.18 Reconciliation of Short-Term Forecast – Energy Comparison



Chapter 21

Normalized Tables and Denormalized SAS Data Sets

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SAP HANA

If you are using SAP HANA as your reporting tool, then you must use normalized tables.

The location to which normalized tables are written is based on the following order of precedence:

1. If you pre-allocated a libref named freport, then SAS Energy Forecasting uses that.
2. If you defined a library named freport of type HANA in the metadata server, then SAS Energy Forecasting uses that.

SAS Visual Analytics

If you are using SAS Visual Analytics as your reporting tool, then you can use either normalized or denormalized tables.

The location to which denormalized tables are written is based on the following order of precedence:

1. If you have pre-allocated a libref named freport, then SAS Energy Forecasting uses that.
2. If you have created a library named freport in the metadata server, then SAS Energy Forecasting uses that.
3. Otherwise, SAS Energy Forecasting creates a folder named rptdata in the data mart.

Common Tables

Introduction

Certain tables are common to all types of forecasts. They are also common to both normalized tables and denormalized SAS data sets.

CALENDAR

The CALENDAR table is replaced each time a forecast is run. It contains these columns:

Table 21.1 Columns in CALENDAR Table

Variable	Type	Length	Format	Informat	Label
UTIL_LOC_CD	Char	20			Util Location Code
DATE	Num	8	NLDATEM.	NLDATEM.	Date
HOLIDAY	Num	8			Holiday
BEFORE_HOLIDAY	Num	8			Before Holiday
AFTER_HOLIDAY	Num	8			After Holiday
YEAR	Num	8			Year
MONTH	Num	8			Month
DAY	Num	8			Day
WEEKDAY	Num	8			Weekday

This figure shows a sample calendar table.

Figure 21.1 Sample Calendar Table

	Util Location Code	Date	Holiday	Before Holiday	After Holiday	Year	Month	Day	Weekday
1	CT	Jan 1, 2003	1	0	0	2003	1	1	4
2	CT	Jan 2, 2003	0	0	201	2003	1	2	5
3	CT	Jan 3, 2003	0	0	0	2003	1	3	6
4	CT	Jan 4, 2003	0	0	0	2003	1	4	7
5	CT	Jan 5, 2003	0	0	0	2003	1	5	1
6	CT	Jan 6, 2003	0	0	0	2003	1	6	2
7	CT	Jan 7, 2003	0	0	0	2003	1	7	3
8	CT	Jan 8, 2003	0	0	0	2003	1	8	4
9	CT	Jan 9, 2003	0	0	0	2003	1	9	5
		Jan 10, 2003	0	0	0	2003	1	10	6
		Jan 11, 2003	0	0	0	2003	1	11	7
		Jan 12, 2003	0	0	0	2003	1	12	1
		Jan 13, 2003	0	0	0	2003	1	13	2
		Jan 14, 2003	0	0	0	2003	1	14	3
		Jan 15, 2003	0	0	0	2003	1	15	4
		Jan 16, 2003	0	0	0	2003	1	16	5
		Jan 17, 2003	0	0	0	2003	1	17	6
		Jan 18, 2003	0	0	0	2003	1	18	7
		Jan 19, 2003	0	0	0	2003	1	19	1
		Jan 20, 2003	0	0	0	2003	1	20	2
		Jan 21, 2003	0	0	0	2003	1	21	3
		Jan 22, 2003	0	0	0	2003	1	22	4
		Jan 23, 2003	0	0	0	2003	1	23	5
		Jan 24, 2003	0	0	0	2003	1	24	6
		Jan 25, 2003	0	0	0	2003	1	25	7
		Jan 26, 2003	0	0	0	2003	1	26	1
		Jan 27, 2003	0	0	0	2003	1	27	2
		Jan 28, 2003	0	0	0	2003	1	28	3
		Jan 29, 2003	0	0	0	2003	1	29	4
		Jan 30, 2003	0	0	0	2003	1	30	5
		Jan 31, 2003	0	0	0	2003	1	31	6
		Feb 1, 2003	0	0	0	2003	2	1	7
		Feb 2, 2003	0	0	0	2003	2	2	1
		Feb 3, 2003	0	0	0	2003	2	3	2
		Feb 4, 2003	0	0	0	2003	2	4	3
		Feb 5, 2003	0	0	0	2003	2	5	4
		Feb 6, 2003	0	0	0	2003	2	6	5
		Feb 7, 2003	0	0	0	2003	2	7	6
		Feb 8, 2003	0	0	0	2003	2	8	7
		Feb 9, 2003	0	0	0	2003	2	9	1
		Feb 10, 2003	0	0	0	2003	2	10	2
		Feb 11, 2003	0	0	0	2003	2	11	3
		Feb 12, 2003	0	0	0	2003	2	12	4
		Feb 13, 2003	0	0	0	2003	2	13	5
		Feb 14, 2003	0	0	0	2003	2	14	6
		Feb 15, 2003	0	0	0	2003	2	15	7
		Feb 16, 2003	0	0	0	2003	2	16	1
		Feb 17, 2003	0	0	0	2003	2	17	2
		Feb 18, 2003	0	0	0	2003	2	18	3
		Feb 19, 2003	0	0	0	2003	2	19	4
		Feb 20, 2003	0	0	0	2003	2	20	5
		Feb 21, 2003	0	0	0	2003	2	21	6
		Feb 22, 2003	0	0	0	2003	2	22	7
		Feb 23, 2003	0	0	0	2003	2	23	1
		Feb 24, 2003	0	0	0	2003	2	24	2
		Feb 25, 2003	0	0	0	2003	2	25	3
		Feb 26, 2003	0	0	0	2003	2	26	4
		Feb 27, 2003	0	0	0	2003	2	27	5
		Feb 28, 2003	0	0	0	2003	2	28	6
		Feb 29, 2003	0	0	0	2003	2	29	7
		Feb 30, 2003	0	0	0	2003	2	30	1
		Feb 31, 2003	0	0	0	2003	2	31	2
		Mar 1, 2003	0	0	0	2003	3	1	3
		Mar 2, 2003	0	0	0	2003	3	2	4
		Mar 3, 2003	0	0	0	2003	3	3	5
		Mar 4, 2003	0	0	0	2003	3	4	6
		Mar 5, 2003	0	0	0	2003	3	5	7
		Mar 6, 2003	0	0	0	2003	3	6	1
		Mar 7, 2003	0	0	0	2003	3	7	2
		Mar 8, 2003	0	0	0	2003	3	8	3
		Mar 9, 2003	0	0	0	2003	3	9	4
		Mar 10, 2003	0	0	0	2003	3	10	5
		Mar 11, 2003	0	0	0	2003	3	11	6
		Mar 12, 2003	0	0	0	2003	3	12	7
		Mar 13, 2003	0	0	0	2003	3	13	1
		Mar 14, 2003	0	0	0	2003	3	14	2
		Mar 15, 2003	0	0	0	2003	3	15	3
		Mar 16, 2003	0	0	0	2003	3	16	4
		Mar 17, 2003	0	0	0	2003	3	17	5
		Mar 18, 2003	0	0	0	2003	3	18	6
		Mar 19, 2003	0	0	0	2003	3	19	7
		Mar 20, 2003	0	0	0	2003	3	20	1
		Mar 21, 2003	0	0	0	2003	3	21	2
		Mar 22, 2003	0	0	0	2003	3	22	3
		Mar 23, 2003	0	0	0	2003	3	23	4
		Mar 24, 2003	0	0	0	2003	3	24	5
		Mar 25, 2003	0	0	0	2003	3	25	6
		Mar 26, 2003	0	0	0	2003	3	26	7
		Mar 27, 2003	0	0	0	2003	3	27	1
		Mar 28, 2003	0	0	0	2003	3	28	2
		Mar 29, 2003	0	0	0	2003	3	29	3
		Mar 30, 2003	0	0	0	2003	3	30	4
		Mar 31, 2003	0	0	0	2003	3	31	5
		Apr 1, 2003	0	0	0	2003	4	1	6
		Apr 2, 2003	0	0	0	2003	4	2	7
		Apr 3, 2003	0	0	0	2003	4	3	1
		Apr 4, 2003	0	0	0	2003	4	4	2
		Apr 5, 2003	0	0	0	2003	4	5	3
		Apr 6, 2003	0	0	0	2003	4	6	4
		Apr 7, 2003	0	0	0	2003	4	7	5
		Apr 8, 2003	0	0	0	2003	4	8	6
		Apr 9, 2003	0	0	0	2003	4	9	7
		Apr 10, 2003	0	0	0	2003	4	10	1
		Apr 11, 2003	0	0	0	2003	4	11	2
		Apr 12, 2003	0	0	0	2003	4	12	3
		Apr 13, 2003	0	0	0	2003	4	13	4
		Apr 14, 2003	0	0	0	2003	4	14	5
		Apr 15, 2003	0	0	0	2003	4	15	6
		Apr 16, 2003	0	0	0	2003	4	16	7
		Apr 17, 2003	0	0	0	2003	4	17	1
		Apr 18, 2003	0	0	0	2003	4	18	2
		Apr 19, 2003	0	0	0	2003	4	19	3
		Apr 20, 2003	0	0	0	2003	4	20	4
		Apr 21, 2003	0	0	0	2003	4	21	5
		Apr 22, 2003	0	0	0	2003	4	22	6
		Apr 23, 2003	0	0	0	2003	4	23	7
		Apr 24, 2003	0	0	0	2003	4	24	1
		Apr 25, 2003	0	0	0	2003	4	25	2
		Apr 26, 2003	0	0	0	2003	4	26	3
		Apr 27, 2003	0	0	0	2003	4	27	4
		Apr 28, 2003	0	0	0	2003	4	28	5
		Apr 29, 2003	0	0	0	2003	4	29	6
		Apr 30, 2003	0	0	0	2003	4	30	7
		May 1, 2003	0	0	0	2003	5	1	1
		May 2, 2003	0	0	0	2003	5	2	2
		May 3, 2003	0	0	0	2003	5	3	3
		May 4, 2003	0	0	0	2003	5	4	4
		May 5, 2003	0	0	0	2003	5	5	5
		May 6, 2003	0	0	0	2003	5	6	6
		May 7, 2003	0	0	0	2003	5	7	7
		May 8, 2003	0	0	0	2003	5	8	1
		May 9, 2003	0	0	0	2003	5	9	2
		May 10, 2003	0	0	0	2003	5	10	3
		May 11, 2003	0	0	0	2003	5	11	4
		May 12, 2003	0	0	0	2003	5	12	5
		May 13, 2003	0	0	0	2003	5	13	6
		May 14, 2003	0	0	0	2003	5	14	7
		May 15, 2003	0	0	0	2003	5	15	1
		May 16, 2003	0	0	0	2003	5	16	2
		May 17, 2003	0	0	0	2003	5	17	3
		May 18, 2003	0	0	0	2003	5	18	4
		May 19, 2003	0	0	0	2003	5	19	5
		May 20, 2003	0	0	0	2003	5	20	6
		May 21, 2003	0	0	0	2003	5	21	7
		May 22, 2003	0	0	0	2003	5	22	1
		May 23, 2003	0	0	0	2003	5	23	2
		May 24, 2003	0	0	0	2003	5	24	3
		May 25, 2003	0	0	0	2003	5	25	4
		May 26, 2003	0	0	0	2003	5	26	5
		May 27, 2003	0	0	0	2003	5	27	6
		May 28, 2003	0	0	0	2003	5	28	7
		May 29, 2003	0	0	0	2003	5	29	1
		May 30, 2003	0	0	0	2003	5	30	2
		May 31, 2003	0	0	0	2003	5	31	3
		Jun 1, 2003	0	0	0	2003	6	1	4
		Jun 2, 2003	0	0	0	2003	6	2	5
		Jun 3, 2003	0	0	0	2003	6	3	6
		Jun 4, 2003	0	0	0	2003	6	4	7
		Jun 5, 2003	0	0	0	2003	6	5	1
		Jun 6, 2003	0	0	0	2003	6	6	2
		Jun 7, 2003	0	0	0	2003	6	7	3
		Jun 8, 2003	0	0	0	2003	6	8	4
		Jun 9, 2003	0	0	0	2003	6	9	5
		Jun 10, 2003	0	0	0				

This figure shows a sample RUN_INFORMATION table.

Figure 21.2 Sample RUN_INFORMATION Table

	Run ID	Forecast Description	Forecast	Datetime	Util Location Code
1	20151201_155719	VT_VST_SmokeTest_Forecast	VSTLF	01Dec2015:15:57:19	VT
2	20151201_155824	VT_ST_SmokeTest_Forecast	STLF	01Dec2015:15:58:24	VT
3	20151201_160013	VT_MLT_SmokeTest_Forecast	MTLTLF	01Dec2015:16:00:13	VT

For more information, see [“Report Data” on page 154](#).

USER_DEFINED_DATA

The USER_DEFINED_DATA table is optional. If it exists, it is appended to each time a forecast is run. It contains these columns:

Table 21.3 Columns in USER_DEFINED_DATA Table

Variable	Type	Length	Format	Informat	Label
RUN_ID_NUM	Char	40			Run ID
RUN_ID_DESC	Char	100			Forecast Description
UD_TYPE_COL_NM	Char	32	\$32.	\$32.	Defined Variable Name
UD_DTTM	Num	8	NLDATM21.	NLDATM21.	Datetime
UD_TYPE_CD	Char	8	\$10.	\$10.	Defined Variable
UD_DT	Num	8	NLDATE20..	NLDATEM14.	Date
UD_HR_NO	Num	8	12.	BEST12.	Hour Ending
UD_NO	Num	8	12.	BEST12.	Def Value

WTHR_DATA

The WTHR_DATA table is appended to each time a forecast is run. It contains these columns:

Table 21.4 Columns WTHR_DATA in Table

Variable	Type	Length	Format	Informat	Label
WTHR_DTTM	Num	8	NLDATM21.	NLDATM21.	Datetime

Variable	Type	Length	Format	Informat	Label
RUN_ID_NM	Char	40			Run ID
RUN_ID_DESC	Char	100			Forecast Description
WTHR_DT	Num	8	NLDATEM.	NLDATEM.	Date
WTHR_HR_NO	Num	8			Hour Ending
WTHR_TYPE_CD	Char	10			Wthr Variable
WTHR_NO	Num	8			Wthr Value

Normalized Tables

Very Short-Term Load Forecasting

Tables

In addition to the common tables (see “Common Tables” on page 124), here are the tables:

- “VSTLF_BCST_RESULTS” on page 127
- “VSTLF_FCST_RESULTS” on page 128
- “VSTLF_FCST_STAT” on page 129
- “VSTLF_OUTLIER” on page 130

VSTLF_BCST_RESULTS

The VSTLF_BCST_RESULTS table is appended to each time a forecast is run. It contains these columns:

Table 21.5 Columns VSTLF_BCST_RESULTS in Table

Variable	Type	Length	Format	Informat	Label
VSTLF_BCST_RESULTS_DTTM	Num	8	NLDATM21.	NLDATM21.	Datetime
RUN_ID_NM	Char	40			Original Run ID
RUN_ID_DESC	Char	100			Forecast Description
VSTLF_BCST_ACT_LOAD_NO	Num	8			Actual Load
VSTLF_BCST_LOAD_NO	Num	8			Backcast Load
VSTLF_BCST_HOURLY_FCST_ER R_NO	Num	8			Forecast Error

Variable	Type	Length	Format	Informat	Label
VSTLF_BCST_HOURLY_MODEL_ERR_NO	Num	8			Model Error
VSTLF_BCST_PREDICTED_LOAD_NO	Num	8	BEST12	12	Predicted Load
VSTLF_BCST_PREDICTED_WTHR_NO	Num	8	BEST12	12	Predicted Temp
VSTLF_BCST_ACTUAL_WTHR_NO	Num	8			Actual Temp
VSTLF_BCST_HR_NO	Num	8			Hour Ending
VSTLF_BCST_HOURLY_FCST_APE_NO	Num	8			Forecast APE
VSTLF_BCST_HOURLY_MODEL_APE_NO	Num	8			Model APE

VSTLF_FCST_RESULTS

The VSTLF_FCST_RESULTS table is appended to each time a forecast is run. It contains these columns:

Table 21.6 Columns in VSTLF_FCST_RESULTS Table

Variable	Type	Length	Format	Informat	Label
VSTLF_FCST_RESULTS_DTTM	Num	8	NLDATM21.	NLDATM21.	Datetime
VSTLF_MODEL_NM	Char	10			Model Name
RUN_ID_NM	Char	40			Run ID
RUN_ID_DESC	Char	100			Forecast Description
VSTLF_FCST_RESULTS_DT	Num	8	NLDATEM.	NLDATE20.	Date
VSTLF_FCST_RESULTS_HR_NO	Num	8			Hour Ending
VSTLF_PREDICTED_LOAD_NO	Num	8			Predicted Load
VSTLF_FCST_WTHR_NO	Num	8			Wthr Value
CHAMPION_FLG	Char	1			Champion Model

VSTLF_FCST_STAT

The VSTLF_FCST_STAT table is appended to each time a forecast is run. It contains these columns:

Table 21.7 Columns in VSTLF_FCST_STAT Table

Variable	Type	Length	Format	Informat	Label
VSTLF_MODEL_NM	Char	40	\$40.	\$40.	Model Name
RUN_ID_NM	Char	40	\$40.	\$40.	Run ID
RUN_ID_DESC	Char	100	\$100.	\$100.	Forecast Description
VSTLF_HOURLY_ME_NO	Num	8	BEST12.	12.	Hourly Me
VSTLF_HOURLY_MAE_NO	Num	8	BEST12.	12.	Hourly Mae
VSTLF_HOURLY_MAPE_NO	Num	8	BEST12.	12.	Hourly Mape
VSTLF_DAILY_PEAK_ME_NO	Num	8	BEST12.	12.	Daily Peak Me
VSTLF_DAILY_PEAK_MAE_NO	Num	8	BEST12.	12.	Daily Peak Mae
VSTLF_DAILY_PEAK_MAPE_NO	Num	8	BEST12.	12.	Daily Peak Mape
VSTLF_DAILY_ME_NO	Num	8	BEST12.	12.	Daily Me
VSTLF_DAILY_MAE_NO	Num	8	BEST12.	12.	Daily Mae
VSTLF_DAILY_MAPE_NO	Num	8	BEST12.	12.	Daily Mape
VSTLF_MONTHLY_PEAK_ME_NO	Num	8	BEST12.	12.	Monthly Peak Me
VSTLF_MONTHLY_PEAK_MAPE_NO	Num	8	BEST12.	12.	Monthly Peak Mape
VSTLF_MONTHLY_PEAK_MAE_NO	Num	8	BEST12.	12.	Monthly Peak Mae
VSTLF_MONTHLY_ME_NO	Num	8	BEST12.	12.	Monthly Me
VSTLF_MONTHLY_MAPE_NO	Num	8	BEST12.	12.	Monthly Mape
VSTLF_MONTHLY_MAE_NO	Num	8	BEST12.	12.	Monthly Mae
VSTLF_ANNUAL_PEAK_ME_NO	Num	8	BEST12.	12.	Annual Peak Me
VSTLF_ANNUAL_PEAK_MAE_NO	Num	8	BEST12.	12.	Annual Peak Mae
VSTLF_ANNUAL_PEAK_MAPE_NO	Num	8	BEST12.	12.	Annual Peak Mape
VSTLF_ANNUAL_ME_NO	Num	8	BEST12.	12.	Annual Me
VSTLF_ANNUAL_MAE_NO	Num	8	BEST12.	12.	Annual Mae

Variable	Type	Length	Format	Informat	Label
VSTLF_ANNUAL_MAPE_NO	Num	8	BEST12.	12.	Annual Mape
VSTLF_WEIGHTED_MAPE_NO	Num	8	BEST12.	12.	Weighted Mape

VSTLF_OUTLIER

The VSTLF_OUTLIER table is appended to each time a forecast is run. It contains these columns:

Table 21.8 Columns VSTLF_OUTLIER in Table

Variable	Type	Length	Format	Informat	Label
VSTLF_OUTLIER_DTTM	Num	8	NLDATM21.	NLDATM21.	Datetime
VSTLF_OUTLIER_TYPE_CD	Char	10	\$10.	\$10.	Outlier Model
RUN_ID_NM	Char	40	\$40.	\$40.	Run ID
RUN_ID_DESC	Char	100	\$100.	\$100.	Forecast Description
VSTLF_WEEK_DAY_NO	Num	8	BEST12.	12.	Week Day No
VSTLF_WEEK_DAY_ORIG_NO	Num	8	BEST12.	12.	Day Orig No
VSTLF_SPECIAL_DAY_NO	Num	8	BEST12.	12.	Special Day No
VSTLF_WTHR_NO	Num	8	BEST12.	12.	Wthr Value
VSTLF_WTHR_TYPE_CD	Char	10	BEST12.	12.	Wthr Variable
VSTLF_ACTUAL_LOAD_NO	Num	8	BEST12.	12.	Actual MW
VSTLF_PREDICTED_LOAD_NO	Num	8	BEST12.	12.	Predicted Load
VSTLF_ERROR_NO	Num	8	BEST12.	12.	Error
VSTLF_ABS_ERROR_NO	Num	8	BEST12.	12.	Absolute Error
VSTLF_ABS_ERROR_PCT	Num	8	BEST12.	12.	Percent Error

Short-Term Load Forecasting

Tables

In addition to the common tables (see “Common Tables” on page 124), here are the tables:

- “STLF_BCST_RESULTS” on page 131
- “STLF_FCST_RESULTS” on page 131
- “STLF_FCST_STAT” on page 132

STLF_BCST_RESULTS

The STLF_BCST_RESULTS table is appended to each time a forecast is run. It contains these columns:

Table 21.9 Columns in STLF_BCST_RESULTS Table

Variable	Type	Length	Format	Informat	Label
STLF_BCST_RESULTS_DTTM	Num	8	NLDATM21.	NLDATM21.	Datetime
RUN_ID_NM	Char	40			Original Run ID
RUN_ID_DESC	Char	100			Forecast Description
STLF_BCST_ACT_LOAD_NO	Num	8			Actual Load
STLF_BCST_LOAD_NO	Num	8			Backcast Load
STLF_BCST_HOURLY_FCST_ERR_NO	Num	8			Forecast Error
STLF_BCST_HOURLY_MODEL_ERROR_NO	Num	8			Model Error
STLF_BCST_ACTUAL_WTHR_NO	Num	8			Actual Temp
STLF_BCST_HR_NO	Num	8			Hour Ending
STLF_BCST_HOURLY_FCST_APE_NO	Num	8			Forecast APE
STLF_BCST_PREDICTED_LOAD_NO	Num	8	BEST12	12	Predicted Load
STLF_BCST_PREDICTED_WTHR_NO	Num	8	BEST12	12	Predicted Temp
STLF_BCST_HOURLY_MODEL_APE_NO	Num	8			Model APE

STLF_FCST_RESULTS

The STLF_FCST_RESULTS table is appended to each time a forecast is run. It contains these columns:

Table 21.10 Columns in STLF_FCST_RESULTS Table

Variable	Type	Length	Format	Informat	Label
STLF_FCST_RESULTS_DTTM	Num	8	NLDATM21.	NLDATM21.	Datetime
STLF_MODEL_NM	Char	10			Model Name
RUN_ID_NM	Char	40			Run ID
RUN_ID_DESC	Char	100			Forecast Description

Variable	Type	Length	Format	Informat	Label
STLF_FCST_RESULTS_DT	Num	8	NLDATEM.	NLDATE20.	Date
STLF_FCST_RESULTS_HR_NO	Num	8			Hour Ending
STLF_PREDICTED_LOAD_NO	Num	8			Predicted Load
STLF_FCST_WTHR_NO	Num	8			Wthr Value
STLF_FCST_WTHR_TYPE_CD	Char	10	\$10	\$10	Wthr Variable
STLF_FCST_RESULTS_END_HR_CD	Char	3	\$3	\$3	Hour Ending Code
CHAMPION_FLG	Char	1			Champion Model

STLF_FCST_STAT

The STLF_FCST_STAT table is appended to each time a forecast is run. It contains these columns:

Table 21.11 Columns in STLF_FCST_STAT Table

Variable	Type	Length	Format	Informat	Label
STLF_MODEL_NM	Char	40	\$40.	\$40.	Model Name
RUN_ID_NM	Char	40	\$40.	\$40.	Run ID
RUN_ID_DESC	Char	100	\$100.	\$100.	Forecast Description
CHAMPION_FLG	Char	1	\$1.	\$1.	Champion Model
STLF_HOURLY_ME_NO	Num	8	BEST12.	12.	Hourly Me
STLF_HOURLY_MAE_NO	Num	8	BEST12.	12.	Houly Mae
STLF_HOURLY_MAPE_NO	Num	8	BEST12.	12.	Hourly Mape
STLF_DAILY_PEAK_ME_NO	Num	8	BEST12.	12.	Daily Peak Me
STLF_DAILY_PEAK_MAE_NO	Num	8	BEST12.	12.	Daily Peak Mae
STLF_DAILY_PEAK_MAPE_NO	Num	8	BEST12.	12.	Daily Peak Mape
STLF_DAILY_ME_NO	Num	8	BEST12.	12.	Daily Me
STLF_DAILY_MAE_NO	Num	8	BEST12.	12.	Daily Mae
STLF_DAILY_MAPE_NO	Num	8	BEST12.	12.	Daily Mape
STLF_MONTHLY_PEAK_ME_NO	Num	8	BEST12.	12.	Monthly Peak Me
STLF_MONTHLY_PEAK_MAPE_NO	Num	8	BEST12.	12.	Monthly Peak Mape

Variable	Type	Length	Format	Informat	Label
STLF_MONTHLY_PEAK_MAE_NO	Num	8	BEST12.	12.	Monthly Peak Mae
STLF_MONTHLY_ME_NO	Num	8	BEST12.	12.	Monthly Me
STLF_MONTHLY_MAPE_NO	Num	8	BEST12.	12.	Monthly Mape
STLF_MONTHLY_MAE_NO	Num	8	BEST12.	12.	Monthly Mae
STLF_ANNUAL_PEAK_ME_NO	Num	8	BEST12.	12.	Annual Peak Me
STLF_ANNUAL_PEAK_MAE_NO	Num	8	BEST12.	12.	Annual Peak Mae
STLF_ANNUAL_PEAK_MAPE_NO	Num	8	BEST12.	12.	Annual Peak Mape
STLF_ANNUAL_ME_NO	Num	8	BEST12.	12.	Annual Me
STLF_ANNUAL_MAE_NO	Num	8	BEST12.	12.	Annual Mae
STLF_ANNUAL_MAPE_NO	Num	8	BEST12.	12.	Annual Mape
STLF_WEIGHTED_MAPE_NO	Num	8	BEST12.	12.	Weighted Mape

Medium-Term/Long-Term Load Forecasting

Tables

In addition to the common tables (see “Common Tables” on page 124), here are the tables:

- “ECONOMY_DATA” on page 133
- “MTLTLF_FCST_RESULTS” on page 134
- “MTLTLF_HFCST_RESULTS” on page 135
- “MTLTLF_PEAK_STAT” on page 136
- “PTMTLT_FCST_MTHLY_STAT” on page 136
- “PTMTLT_FCST_RESULTS” on page 137
- “PTMTLT_HFCST_MTHLY_STAT” on page 137
- “PTMTLT_HFCST_RESULTS” on page 138

ECONOMY_DATA

The ECONOMY_DATA table is appended to each time a forecast is run. It contains these columns:

Table 21.12 Columns ECONOMY_DATA in Table

Variable	Type	Length	Format	Informat	Label
ECONOMY_DT (key)	Num	8	NLDATEM.	NLDATE20.	Date

Variable	Type	Length	Format	Informat	Label
RUN_ID_NM (foreign key))	Char	40			Run ID
RUN_ID_DESC	Char	100	NLNUM15.3	NLNUM15.3	Forecast Description
GROSS_PRODUCT_S0_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Base
GROSS_PRODUCT_S1_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 1
GROSS_PRODUCT_S2_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 2
GROSS_PRODUCT_S3_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 3
GROSS_PRODUCT_S4_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 4
GROSS_PRODUCT_S5_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 5
GROSS_PRODUCT_S6_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 6

MTLTLF_FCST_RESULTS

The MTLTLF_FCST_RESULTS table contains the results of medium-term/long-term probabilistic forecasting. It is appended to each time a forecast is run. It contains these columns:

Table 21.13 Columns in MTLTLF_FCST_RESULTS Table

Variable	Type	Length	Format	Informat	Label
MTLTLF_FCST_RESULTS_DTTM	Num	8	NLDATM21.	NLDATM21.	Datetime
MTLTLF_MODEL_NM	Char	40			Model Name
MTLTLF_MODEL_ECONOMIC_SCN_NO	Num	8			Economic Scn
MTLTLF_RESULTS_YEAR_ORIG_NO	Num	8			Year Orig
RUN_ID_NM	Char	40			Run ID
RUN_ID_DESC	Char	100			Forecast Description
MTLTLF_FCST_RESULTS_DT	Num	8	NLDATEM.	NLDATE20.	Date
MTLTLF_FCST_RESULTS_HR_NO	Num	8			Hour Ending
MTLTLF_RESULTS_YEAR_NO	Num	8			Year
MTLTLF_ACTUAL_LOAD_NO	Num	8			Actual MW
MTLTLF_PREDICTED_LOAD_NO	Num	8			Predicted Load
MTLTLF_FCST_RESULTS_END_HR_CD	Char	3			Hour Ending Code

Variable	Type	Length	Format	Informat	Label
MTLTLF_FCST_ECONOMIC_SRC_CD	Char	3			Economic Scn Code
MTLTLF_FCST_TEMP_YEAR_CD	Char	4			Year Orig Code

MTLTLF_HFCST_RESULTS

The MTLTLF_FCST_RESULTS table displays the results of medium-term/long-term probabilistic forecasting. It is appended to each time a forecast is run. It contains these columns:

Table 21.14 Columns in MTLTLF_FCST_RESULTS Table

Variable	Type	Length	Format	Informat	Label
MTLTLF_HFCST_RESULTS_DTTM	Num	8	NLDATM21.	NLDATM21.	Datetime
MTLTLF_MODEL_NM	Char	40			Model Name
MTLTLF_MODEL_ECONOMIC_SCN_NO	Num	8			Economic Scn
MTLTLF_RESULTS_YEAR_ORIG_NO	Num	8			Year Orig
RUN_ID_NM	Char	40			Run ID
RUN_ID_DESC	Char	100			Forecast Description
MTLTLF_HFCST_RESULTS_DT	Num	8	NLDATEM.	NLDATE20.	Date
MTLTLF_HFCST_RESULTS_HR_NO	Num	8			Hour Ending
MTLTLF_RESULTS_YEAR_NO	Num	8			Year
MTLTLF_ACTUAL_LOAD_NO	Num	8			Actual MW
MTLTLF_PREDICTED_LOAD_NO	Num	8			Predicted Load
MTLTLF_HFCST_RESULTS_END_HR_CD	Char	3			Hour Ending Code
MTLTLF_MODEL_ECONOMIC_SRC_CD	Char	3			Economic Scn Code
MTLTLF_HIST_TEMP_YEAR_CD	Char	4			Year Orig Code

MTLTLF_PEAK_STAT

The MTLTLF_PEAK_STAT table contains peak results from probabilistic forecasting. The table is appended to each time a forecast is run. It contains these columns:

Table 21.15 Columns in MTLTLF_PEAK_STAT Table

Variable	Type	Length	Format	Informat	Label
MTLTLF_PEAK_YR_NO (key)	Num	8	BEST12.	12.	Year
MTLTLF_MODEL_NM (key)	Char	40	\$40.	\$40.	Model Name
MTLTLF_MODEL_ECONOMIC_SCN_NO (key)	Num	8	BEST12.	12.	Economic Scn
RUN_ID_NM (foreign key)	Char	40	\$40.	\$40.	Run ID
RUN_ID_DESC	Char	100	\$100.	\$100.	Forecast Description
MTLTLF_PEAK_NO	Num	8	BEST12.	12.	Annual Peak
MTLTLF_PEAK_MIN_NO	Num	8	BEST12.	12.	Min
MTLTLF_PEAK_P10_NO	Num	8	BEST12.	12.	P10
MTLTLF_PEAK_ME_NO	Num	8	BEST12.	12.	Mean
MTLTLF_PEAK_MED_NO	Num	8	BEST12.	12.	Median
MTLTLF_PEAK_P90_NO	Num	8	BEST12.	12.	P90
MTLTLF_PEAK_MAX_NO	Num	8	BEST12.	12.	Max
MTLTLF_PEAK_ACTUAL_NO	Num	8	BEST12.	12.	Actual Peak

PTMTLT_FCST_MTHLY_STAT

The PTMTLT_FCST_MTHLY_STAT table contains monthly energy and load factor data from the medium-term/long-term point forecasting. The table is appended to each time a forecast is run. It contains these columns:

Variable	Type	Length	Format	Informat	Label
PTMTLT_MODEL_NM	Char	40	\$40	\$40	Model Name
PTMTLT_MODEL_ECONOMIC_SCN_NO	Num	8	BEST12	12	Economic Scn
RUN_ID_NM	Char	40	\$40	\$40	Run ID
RUB_ID_DESC	Char	100	\$100	\$100	Forecast Description
PTMTLT_FCST_MTHLY_PEAK_LOAD_NO	Num	8	BEST12	12	Monthly Peak MW
PTMTLT_FCST_MTHLY_ENERGY_NO	Num	8	BEST12	12	Monthly Energy MW

Variable	Type	Length	Format	Informat	Label
PTMTLT_FCST_MTHLY_LOAD_FACTOR_NO	Num	8	BEST12	12	Monthly Load Factor
PTMTLT_FCST_MONTH_CD	Char	4	\$4	\$4	Forecast Month
PTMTLT_FCST_YEAR_CD	Char	4	\$4	\$4	Forecast Year

PTMTLT_FCST_RESULTS

The PTMTLT_FCST_RESULTS table contains the results of medium-term/long-term point forecasting. It is appended to each time a forecast is run. It contains these columns:

Variable	Type	Length	Format	Informat	Label
PTMTLT_FCST_RESULTS_DTTM	Num	8	NLDATM21	NLDATM21	Datetime
PTMTLT_MODEL_NM	Char	40	\$40	\$40	Model Name
PTMTLT_MODEL_ECONOMIC_SCN_NO	Num	8	BEST12	\$12	Economic Scn
RUN_ID_NM	Char	40	\$40	\$40	Run ID
RUB_ID_DESC	Char	100	\$100	\$100	Forecast Description
PTMTLT_FCST_RESULTS_DT	Num	8	NLDATEM14	NLDATE20	Date
PTMTLT_FCST_RESULTS_HR_NO	Num	8	BEST12	\$12	Hour Ending
PTMTLT_RESULTS_YEAR_NO	Num	8	BEST12	\$12	Year
PTMTLT_ACTUAL_LOAD_NO	Num	8	BEST12	\$12	Actual MW
PTMTLT_PREDICTED_LOAD_NO	Num	8	BEST12	\$12	Predicted Load
PTMTLT_FCST_RESULTS_END_HR_CD	Char	3	\$3	\$3	Hour Ending Code
PTMTLT_FCST_ECONOMIC_SR_C_CD	Char	3	\$3	\$3	Economic Scn Code

PTMTLT_HFCST_MTHLY_STAT

The PTMTLT_HFCST_MTHLY_STAT table contains monthly energy and load factor data from the medium-term/long-term point forecasting over a historical period of time. The table is appended to each time a forecast is run. It contains these columns:

Variable	Type	Length	Format	Informat	Label
PTMTLT_MODEL_NM	Char	40	\$40	\$40	Model Name

Variable	Type	Length	Format	Informat	Label
PTMTLT_MODEL_ECONOMIC_SCN_NO	Num	8	BEST12	\$12	Economic Scn
RUN_ID_NM	Char	40	\$40	\$40	Run ID
RUB_ID_DESC	Char	100	\$100	\$100	Forecast Description
PTMTLT_HFCST_RESMTTHLOAD_FACT_NO	Num	8	BEST12	12	Monthly Load Factor
PTMTLT_HFCST_RESMTTHPEAK_LOAD_NO	Num	8	BEST12	12	Monthly Peak MW
PTMTLT_HFCST_RESMTTHENERGY_NO	Num	8	BEST12	12	Monthly Energy MW
PTMTLT_HFCST_MONTH_CD	Char	4	\$4	\$4	Forecast Month
PTMTLT_HFCST_YEAR_CD	Char	4	\$4	\$4	Forecast Year

PTMTLT_HFCST_RESULTS

The PTMTLT_HFCST_RESULTS table contains the results of medium-term/long-term point forecasting over a historical period of time. The table is appended to each time a forecast is run. It contains these columns:

Variable	Type	Length	Format	Informat	Label
PTMTLT_HFCST_RESULTS_DTM	Num	8	NLDATM21	NLDATM21	Datetime
PTMTLT_MODEL_NM	Char	40	\$40	\$40	Model Name
PTMTLT_MODEL_ECONOMIC_SCN_NO	Num	8	BEST12	\$12	Economic Scn
RUN_ID_NM	Char	40	\$40	\$40	Run ID
RUB_ID_DESC	Char	100	\$100	\$100	Forecast Description
PTMTLT_HFCST_RESULTS_DT	Num	8	NLDATEM14	NLDATE20	Date
PTMTLT_HFCST_RESULTS_HR_NO	Num	8	BEST12	\$12	Hour Ending
PTMTLT_RESULTS_YEAR_NO	Num	8	BEST12	\$12	Year
PTMTLT_ACTUAL_LOAD_NO	Num	8	BEST12	\$12	Actual MW
PTMTLT_PREDICTED_LOAD_NO	Num	8	BEST12	\$12	Predicted Load
PTMTLT_HFCST_RESULTS_END_HR_CD	Char	3	\$3	\$3	Hour Ending Code

PTMTLT_MODEL_ECONOMIC_S RC_CD	Char	3	\$3	\$3	Economic Scn Code
----------------------------------	------	---	-----	-----	-------------------

Denormalized SAS Data Sets

Very Short-Term Load Forecasting

Tables

In addition to the common tables CALENDAR and RUN_INFORMATION (see “Common Tables” on page 124), here are the tables:

- “VSTLF_FCST_RESULTS_MAST” on page 139

VSTLF_FCST_RESULTS_MAST

The VSTLF_FCST_RESULTS_MAST table is appended to each time a forecast is run. It contains these columns:

Table 21.16 Columns VSTLF_FCST_RESULTS_MAST in Table

Variable	Type	Length	Format	Informat	Label
VSTLF_FCST_RESULTS_DTTM	Num	8	NLDATM21.	NLDATM21.	Datetime
VSTLF_MODEL_NM	Num	10			Model Name
RUN_ID_NM	Num	40			Run ID
4 RUN_ID_DESC	Num	100			Forecast Description
VSTLF_FCST_RESULTS_DT	Num	8			Date
VSTLF_FCST_RESULTS_HR_NO	Num	8			Hour Ending
VSTLF_PREDICTED_LOAD_NO	Num	8			Predicted Load
VSTLF_HOURLY_ME_NO	Num	8			Hourly Me
VSTLF_HOURLY_MAE_NO	Num	8			Houly Mae
VSTLF_HOURLY_MAPE_NO	Num	8			Hourly Mape
VSTLF_DAILY_PEAK_ME_NO	Num	8			Daily Peak Me
VSTLF_DAILY_PEAK_MAE_NO	Num	8			Daily Peak Mae
VSTLF_DAILY_PEAK_MAPE_NO	Num	8			Daily Peak Mape
VSTLF_DAILY_ME_NO	Num	8			Daily Me
VSTLF_DAILY_MAE_NO	Num	8			Daily Mae

Variable	Type	Length	Format	Informat	Label
VSTLF_DAILY_MAPE_NO	Num	8			Daily Mape
VSTLF_MONTHLY_PEAK_ME_NO	Num	8			Monthly Peak Me
VSTLF_MONTHLY_PEAK_MAPE_NO	Num	8			Monthly Peak Mape
VSTLF_MONTHLY_PEAK_MAE_NO	Num	8			Monthly Peak Mae
VSTLF_MONTHLY_ME_NO	Num	8			Monthly Me
VSTLF_MONTHLY_MAPE_NO	Num	8			Monthly Mape
VSTLF_MONTHLY_MAE_NO	Num	8			Monthly Mae
VSTLF_ANNUAL_PEAK_ME_NO	Num	8			Annual Peak Me
VSTLF_ANNUAL_PEAK_MAE_NO	Num	8			Annual Peak Mae
VSTLF_ANNUAL_PEAK_MAPE_NO	Num	8			Annual Peak Mape
VSTLF_ANNUAL_ME_NO	Num	8			Annual Me
VSTLF_ANNUAL_MAE_NO	Num	8			Annual Mae
VSTLF_ANNUAL_MAPE_NO	Num	8			Annual Mape
VSTLF_WEIGHTED_MAPE_NO	Num	8			Weighted Mape
VSTLF_WEEK_DAY_NO	Num	8			Week Day No
VSTLF_WEEK_DAY_ORIG_NO	Num	8			Day Orig No
VSTLF_SPECIAL_DAY_NO	Num	8			Special Day No
VSTLF_ACTUAL_LOAD_NO	Num	8			Actual MW
VSTLF_ERROR_NO	Num	8			Error
VSTLF_ABS_ERROR_NO	Num	8			Absolute Error
VSTLF_ABS_ERROR_PCT	Num	8	NLNUM9.4	NLNUM9.4	Percent Error
UD_TYPE_CD	Char	10			Defined Variable
UD_NO	Num	8			Defined Variable Value
UD_TYPE_COL_NM	Char	32			Defined Variable Name
WTHR_TYPE_CD	Char	10			Wthr Variable
WTHR_NO	Num	8			Wthr Value

Variable	Type	Length	Format	Informat	Label
UTIL_LOC_CD	Char	20			Util Location Code
WTHR_LOC_CD	Char	20			Wthr Station Code
WTHR_LOC_NM	Char	40			Wthr Station Name
WTHR_LOC_DESC	Char	100			Wthr Station Desc
UTIL_LOC_NM	Char	40			Util Name
UTIL_LOC_DESC	Char	100			Util Desc
CHAMPION_FLG	Char	8			Champion Model
VSTLF_BCST_ACT_LOAD_NO	Num	8			Actual Load
VSTLF_BCST_LOAD_NO	Num	8			Backcast Load
VSTLF_BCST_HOURLY_FCST_ER R_NO	Num	8			Forecast Error
VSTLF_BCST_HOURLY_MODEL_ ERR_NO	Num	8			Model Error
VSTLF_BCST_HOURLY_FCST_AP E_NO	Num	8			Forecast APE
VSTLF_BCST_HOURLY_MODEL_ APE_NO	Num	8			Model APE
VSTLF_BCST_HR_NO	Num	8			Hour Ending
VSTLF_BCST_ACTUAL_WTHR_N O	Num	8			Actual Temp
VSTLF_FCST_WTHR_NO	Num	8			Wthr Value

Short-Term Load Forecasting

Tables

In addition to the common tables CALENDAR and RUN_INFORMATION (see “Common Tables” on page 124), here are the tables:

- “STLF_FCST_RESULTS_MAST” on page 142

STLF_FCST_RESULTS_MAST

The STLF_FCST_RESULTS_MAST table is appended to each time a forecast is run. It contains these columns:

Table 21.17 Columns in STLF_FCST_RESULTS_MAST Table

Variable	Type	Length	Format	Informat	Label
STLF_FCST_RESULTS_DTTM	Num	8	NLDATM21.	NLDATM21.	Datetime
STLF_MODEL_NM	Num	10			Model Name
RUN_ID_NM	Num	40			Run ID
4 RUN_ID_DESC	Num	100			Forecast Description
STLF_FCST_RESULTS_DT	Num	8			Date
STLF_FCST_RESULTS_HR_NO	Num	8			Hour Ending
STLF_PREDICTED_LOAD_NO	Num	8			Predicted Load
STLF_HOURLY_ME_NO	Num	8			Hourly Me
STLF_HOURLY_MAE_NO	Num	8			Houly Mae
STLF_HOURLY_MAPE_NO	Num	8			Hourly Mape
STLF_DAILY_PEAK_ME_NO	Num	8			Daily Peak Me
STLF_DAILY_PEAK_MAE_NO	Num	8			Daily Peak Mae
STLF_DAILY_PEAK_MAPE_NO	Num	8			Daily Peak Mape
STLF_DAILY_ME_NO	Num	8			Daily Me
STLF_DAILY_MAE_NO	Num	8			Daily Mae
STLF_DAILY_MAPE_NO	Num	8			Daily Mape
STLF_MONTHLY_PEAK_ME_NO	Num	8			Me Peak
STLF_MONTHLY_PEAK_MAPE_NO	Num	8			Mape Peak
STLF_MONTHLY_PEAK_MAE_NO	Num	8			Mae Peak
STLF_MONTHLY_ME_NO	Num	8			Monthly Me
STLF_MONTHLY_MAPE_NO	Num	8			Monthly Mape
STLF_MONTHLY_MAE_NO	Num	8			Monthly Mae
STLF_ANNUAL_PEAK_ME_NO	Num	8			Annual Peak Me
STLF_ANNUAL_PEAK_MAE_NO	Num	8			Annual Peak Mae

Variable	Type	Length	Format	Informat	Label
STLF_ANNUAL_PEAK_MAPE_NO	Num	8			Annual Peak Mape
STLF_ANNUAL_ME_NO	Num	8			Annual Me
STLF_ANNUAL_MAE_NO	Num	8			Annual Mae
STLF_ANNUAL_MAPE_NO	Num	8			Annual Mape
STLF_WEIGHTED_MAPE_NO	Num	8			Weighted Mape
UD_TYPE_CD	Char	10			Defined Variable
UD_NO	Num	8			Defined Variable Value
UD_TYPE_COL_NM	Char	32			Defined Variable Name
WTHR_TYPE_CD	Char	10			Wthr Variable
WTHR_NO	Num	8			Wthr Value
UTIL_LOC_CD	Char	20			Util Location Code
WTHR_LOC_CD	Char	20			Wthr Station Code
WTHR_LOC_NM	Char	40			Wthr Station Name
WTHR_LOC_DESC	Char	100			Wthr Station Desc
UTIL_LOC_NM	Char	40			Util Name
UTIL_LOC_DESC	Char	100			Util Desc
CHAMPION_FLG	Char	8			Champion Model
STLF_BCST_ACT_LOAD_NO	Num	8			Actual Load
STLF_BCST_LOAD_NO	Num	8			Backcast Load
STLF_BCST_HOURLY_FCST_ERR_NO	Num	8			Forecast Error
STLF_BCST_HOURLY_MODEL_ERROR_NO	Num	8			Model Error
STLF_BCST_HOURLY_FCST_APE_NO	Num	8			Forecast APE
STLF_BCST_HOURLY_MODEL_APE_NO	Num	8			Model APE
STLF_BCST_LST24HRFCST_MAPE_NO	Num	8			Prev Forecast MAPE
STLF_BCST_LST24HRMODL_MAPE_NO	Num	8			Prev Model MAPE
STLF_BCST_HR_NO	Num	8			Hour Ending

Variable	Type	Length	Format	Informat	Label
STLF_BCST_ACTUAL_WTHR_NO	Num	8			Actual Temp

Medium-Term/Long-Term Load Forecasting

Tables

In addition to the common tables CALENDAR and RUN_INFORMATION (see “Common Tables” on page 124), here are the tables:

- “MTLTLF_FCST_RESULTS_MAST” on page 144
- “PTMTLT_FCST_RESULTS_MAST” on page 145

MTLTLF_FCST_RESULTS_MAST

The MTLTLF_FCST_RESULTS_MAST table is appended to each time a forecast is run. It contains these columns for a medium-term/long-term probabilistic forecast:

Table 21.18 Columns in MTLTLF_FCST_RESULTS_MAST Table

Variable	Type	Length	Format	Informat	Label
MTLTLF_FCST_RESULTS_DTTM	Num	8	NLDATM21.	NLDATM21.	Datetime
MTLTLF_MODEL_NM	Char	40			Model Name
MTLTLF_MODEL_ECONOMIC_SCN_NO	Num	8			Economic Scn
MTLTLF_RESULTS_YEAR_ORIG_NO	Num	8			Year Orig
RUN_ID_NM	Char	40			Run ID
RUN_ID_DESC	Char	100			Forecast Description
MTLTLF_FCST_RESULTS_DT	Num	8	NLDATEM.	NLDATEM.	Date
MTLTLF_FCST_RESULTS_HR_NO	Num	8			Hour Ending
MTLTLF_RESULTS_YEAR_NO	Num	8			Year
MTLTLF_ACTUAL_LOAD_NO	Num	8			Actual MW
MTLTLF_PREDICTED_LOAD_NO	Num	8			Predicted Load
MTLTLF_PEAK_NO	Num	8			Peak Annual
MTLTLF_PEAK_MIN_NO	Num	8			Min
MTLTLF_PEAK_P10_NO	Num	8			P10
MTLTLF_PEAK_ME_NO	Num	8			Mean

Variable	Type	Length	Format	Informat	Label
MTLTLF_PEAK_MED_NO	Num	8			Median
MTLTLF_PEAK_P90_NO	Num	8			P90
MTLTLF_PEAK_MAX_NO	Num	8			Max
MTLTLF_PEAK_ACTUAL_NO	Num	8			Actual Peak
GROSS_PRODUCT_S0_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Base
GROSS_PRODUCT_S1_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 1
GROSS_PRODUCT_S2_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 2
GROSS_PRODUCT_S3_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 3
GROSS_PRODUCT_S4_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 4
GROSS_PRODUCT_S5_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 5
GROSS_PRODUCT_S6_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 6
WTHR_TYPE_CD	Char	10			Wthr Variable
WTHR_NO	Num	8			Wthr Value
UD_TYPE_CD	Char	10			Defined Variable
UD_NO	Num	8			Defined Variable Value
UD_TYPE_COL_NM	Char	32			Defined Variable Name
UTIL_LOC_CD	Char	20			Util Location Code
WTHR_LOC_CD	Char	20			Wthr Station Code
WTHR_LOC_NM	Char	40			Wthr Station Name
WTHR_LOC_DESC	Char	100			Wthr Station Desc
UTIL_LOC_NM	Char	40			Util Name
UTIL_LOC_DESC	Char	100			Util Desc

PTMTLT_FCST_RESULTS_MAST

The PTMTLT_FCST_RESULTS_MAST table is appended to each time a forecast is run. It contains these columns for the results of a medium-term/long-term point forecast:

Table 21.19 Columns in PTMTLT_FCST_RESULTS_MAST Table

Variable	Type	Length	Format	Informat	Label
PTMTLT_FCST_RESULTS_DTTM	Num	8	NLDATM21.	NLDATM21.	Datetime

Variable	Type	Length	Format	Informat	Label
PTMTLT_MODEL_NM	Char	40			Model Name
PTMTLT_MODEL_ECONOMIC_SCN_NO	Num	8			Economic Scn
RUN_ID_NM	Char	40			Run ID
RUN_ID_DESC	Char	100			Forecast Description
PTMTLT_FCST_RESULTS_DT	Num	8	NLDATEM.	NLDATEM.	Date
PTMTLT_FCST_RESULTS_HR_NO	Num	8			Hour Ending
PTMTLT_RESULTS_YEAR_NO	Num	8			Year
PTMTLT_ACTUAL_LOAD_NO	Num	8			Actual MW
PTMTLT_PREDICTED_LOAD_NO	Num	8			Predicted Load
PTMTLT_FCST_MTHLY_PEAK_LOAD_NO	Num	8			Monthly Peak MW
PTMTLT_FCST_MTHLY_ENERGY_NO	Num	8			Monthly Energy MW
PTMTLT_FCST_MTHLY_LOAD_FACTOR_NO	Num	8			Monthly Load Factor
PTMTLT_FCST_RESULTS_END_HR_CD	Char	20			Hour Ending Code
PTMTLT_FCST_ECONOMIC_SRC_CD	Char	20			Economic Scn Code
GROSS_PRODUCT_S0_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Base
GROSS_PRODUCT_S1_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 1
GROSS_PRODUCT_S2_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 2
GROSS_PRODUCT_S3_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 3
GROSS_PRODUCT_S4_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 4
GROSS_PRODUCT_S5_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 5
GROSS_PRODUCT_S6_AMT	Num	8	NLNUM15.3	NLNUM15.3	Economic Scn 6
WTHR_TYPE_CD	Char	10			Wthr Variable
WTHR_NO	Num	8			Wthr Value
UD_TYPE_CD	Char	10			Defined Variable
UD_NO	Num	8			Defined Variable Value
UD_TYPE_COL_NM	Char	32			Defined Variable Name

Variable	Type	Length	Format	Informat	Label
UTIL_LOC_CD	Char	20			Util Location Code
WTHR_LOC_CD	Char	20			Wthr Station Code
WTHR_LOC_NM	Char	40			Wthr Station Name
WTHR_LOC_DESC	Char	100			Wthr Station Desc
UTIL_LOC_NM	Char	40			Util Name
UTIL_LOC_DESC	Char	100			Util Desc
PTMTLT_FCST_MONTH_CD					Forecast Month
PTMTLT_FCST_YEAR_CD					Forecast Year

Part 6

Administration

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Chapter 22

Project Folders

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Overview

A project folder contains these items:

- Diagnose definitions

Each diagnose definition folder (for more information, see [“Diagnose Definition Folder” on page 152](#)) contains the following:

- A subfolder for each instance of running the diagnose definition (for more information, see [“Diagnose Instance Folder” on page 153](#)).
- A subfolder for each forecast definition that uses the results of that diagnose (for more information, see [“Forecast Definition Folder” on page 153](#)).
- A subfolder for each forecast instance under the forecast definition.
- Reconciliation definitions and instances

Each reconciliation definition folder contains a copy of the reconciliation parameters template (parm_rec) and a subfolder for the results of each instance of running the reconciliation definition. For more information, see [“Reconciliation Definition Folder” on page 154](#).

- Report data

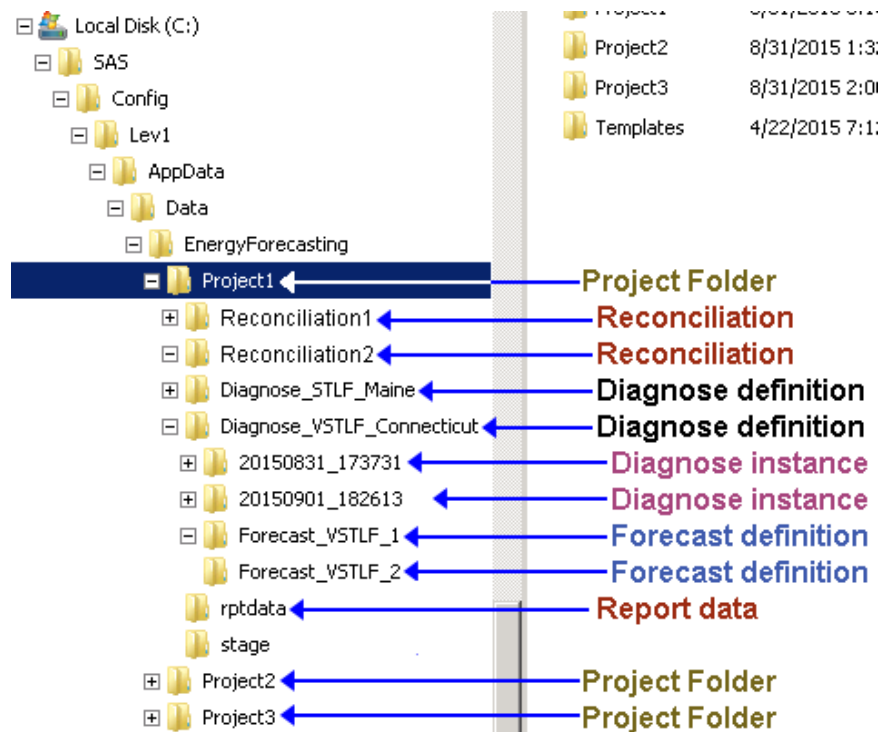
Each project contains a folder named rptdata. For more information, see [“Report Data” on page 154](#).

- Stage data

Each project contains a folder named stage. This folder is used by SAS Energy Forecasting whenever a diagnose or forecast has been set to run. Upon completion of a run, the contents of this folder are deleted.

Here is an example of a project folder:

Figure 22.1 Example Project Folder



Diagnose Definition Folder

A diagnose definition folder contains these items:

- The file `parm_vsel`, which contains the diagnose parameters that were established during the initial setup of the diagnose.
For more information, see [“PARM_VSEL” on page 200](#).
- Subfolders for each instance of running the diagnose definition. Each instance folder is named according to the date and time of the run.
For more information, see [“Diagnose Instance Folder” on page 153](#).
- Subfolders for forecast definitions.

The forecast definition folder contains a subfolder for each instance of running the forecast definition. Each subfolder is named according to the date and time of the run.

For more information, see [“Forecast Definition Folder” on page 153](#) and [“Forecast Instance Folder” on page 153](#).

Diagnose Instance Folder

A diagnose instance folder contains the results of one instance of running a particular diagnose definition.

A diagnose instance folder contains these items:

- The `parm_vsel` data set, which contains the diagnose parameters that were used in the diagnose run instance. For more information, see [“PARM_VSEL” on page 200](#).
- The messages data set, which contains the run history of the instance showing date and time, type of message, and message text.

A diagnose instance folder contains these subfolders:

- `sources`, which contains a copy of the input files stored at the input file location. The user can choose to delete the input files after running a diagnose. For more information, see [“Input Path for SAS Input Data Source” on page 11](#).
- `results`, which contains the output of the diagnose run that is available for viewing within SAS Energy Forecasting.
- `work`, which contains SAS code that is used in the execution of the diagnose instance.

Forecast Definition Folder

A forecast definition folder contains these items:

- The file `parm_xxxx` (where `xxxx` is the type of forecast), which contains the forecast parameters that were established during the initial setup of the forecast.
- Subfolders for each instance of running the forecast definition. Each instance folder is named according to the date and time of the run.

For more information, see [“Forecast Instance Folder” on page 153](#).

Forecast Instance Folder

A forecast instance folder contains these items:

- The file `parm_xxxx` (where `xxxx` is the forecast type), which contains the forecast parameters that were used in the forecast run instance.
- The messages data set, which contains the run history of the instance showing date and time, type of message, and message text.

A forecast instance folder (which contains the results of one instance of running a particular forecast definition) contains three subfolders:

- `sources`, which contains a copy of the input files for the forecast stored at the input file location. The user can choose to delete the input files after running a

diagnose. For more information, see [“Input Path for SAS Input Data Source”](#) on page 11.

- results, which contains a copy of the input files stored in the input file location
- work, which is used to temporarily store SAS code used in the execution of the forecast instance but is deleted upon completion

Reconciliation Definition Folder

A reconciliation definition folder contains these items:

- The file `parm_rec`, which contains the reconciliation parameters that were established during the initial setup of the reconciliation. For more information, see [“PARM_REC”](#) on page 198.
- Subfolders for each instance of running the reconciliation definition. Each instance folder is named according to the date and time of the run.

Each reconciliation instance folder contains these subfolders:

- The file `parm_rec`, which contains the reconciliation parameters that were used in the reconciliation run instance. For more information, see [“PARM_REC”](#) on page 198.
- The messages data set, which contains the run history of the instance showing date and time, type of message, and message text.
- results, which contains the output of the reconcile run that is available for viewing within SAS Energy Forecasting
- sources, which is used to temporarily store a copy of the input files stored at the input file location and used in the execution of the reconcile instance but is deleted upon completion.
- work, which is used to temporarily store SAS code used in the execution of the reconcile instance but is deleted upon completion.

Report Data

Whenever a user creates a forecast definition, the user specifies the format in which to create the report data: SAS, HANA, or none. The data can be used outside of SAS Energy Forecasting to create reports with tools such as SAS Visual Analytics.

When a user runs a forecast, report data is created and stored in the `rptdata` folder in the specified format:

- HANA: Data is written to the SAP HANA database.
- SAS: Data is written to the `rptdata` folder under the project.

TIP Because these files are appended to each time that a forecast is run, they can become large. Moreover, report data for a forecast is not deleted even when the forecast is deleted (even though other forecast result files are deleted). So, you should monitor the growth of these report files to avoid using excessive disk space.

For more information, see [Chapter 20, “Producing Reports,”](#) on page 111.

Chapter 23

Application Settings

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Overview

When SAS Energy Forecasting is installed, there are several application settings that are set to default values. These settings are managed using SAS Management Console. The values can be changed to improve performance or to assist in managing data logs.

Here are the application settings and their default values:

- Save Active Logs: False
- Save Error Data: None
- Delete Archive Data: False
- Number of concurrent diagnose jobs: 1
- Number of concurrent forecast jobs: 2

TIP To improve the performance of running large numbers of forecasts, it is recommended that you change the number of concurrent forecast jobs to a value equal to the number of CPUs that are allocated to running SAS Energy Forecasting.

- Number of diagnose results to keep: 2
- Archive MTLT forecast results older than this many weeks: 52
- Archive ST forecast results older than this many days: 14
- Archive VST forecast results older than this many hours: 168
- System time-out, in minutes, for diagnose jobs: 720

TIP To ensure that the system does not time out when running long-term diagnose jobs, it is recommended that you increase the system time-out for diagnose jobs from 720 to 1440 minutes.

- System time-out, in minutes, for MTLT forecast jobs: 360
- System time-out, in minutes, for ST forecast jobs: 360

- System time-out, in minutes, for VST forecast jobs: 360

Note: When the default settings are changed for **Number of concurrent diagnose jobs** or **Number of concurrent forecast jobs**, the SAS Config-Lev1 servers must be restarted. Restart these servers in Microsoft Management Console by selecting **Windows Administrative Tools** ⇒ **Services**.

To change these settings, see [“Manage Application Settings” on page 158](#).

Manage Application Settings

1. Open SAS Management Console.
2. On the **Plug-ins** tab, expand **Application Management** ⇒ **Configuration Manager** ⇒ **SAS Application Infrastructure**.
3. Right-click **Energy Forecasting 3.2**, and then select **Properties**.
The Energy Forecasting 3.2 Properties window appears.
4. Click the **Settings** tab.
5. On the left side, select **Energy Forecasting**.
6. Modify the properties that you want.

Register a User to Receive Email Alerts

1. Open SAS Management Console.
2. On the **Plug-Ins** tab, expand **Environment Management**.
3. Select **User Manager**.
4. Right-click a user who accesses SAS Energy Forecasting and select **Properties**.
The Properties window appears.
5. On the **General** tab, click **E-mail**, and then click **New**.

SEF User Properties

General | Groups and Roles | Accounts | Authorization

User External Id

Name: SEF User

Display Name: SEF User

Job Title:

Description:

E-mail	Type	Address
Phone	POP3	user@address.com
Address		

New Edit Delete

The E-mail Properties window appears.

6. Specify the information, and then click **OK**.

Chapter 24

Input Files

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View Sample Data

The input tables include business facts and related dimensions for the operations that SAS Energy Forecasting performs. The input data contains load, weather, calendar, economic, utility, weather station, and user-defined tables.

Dimension Tables	Fact Tables
Utility Location	Load
Weather Station	Weather
Calendar	Economy
Utility x Weather Station	User-Defined

Upon installation of SAS Energy Forecasting, sample data sets are placed in **C:\Program Files\SASHome\SASFoundation\9.4\enfcsvr\sasmisc** for you to use to create a diagnose and run forecasts.

Note: The same input tables are used both for diagnose and for forecasts.

Calendar Table

The calendar table, `calendar.sas7bdat`, defines holidays and regular week days. It contains these columns:

Table 24.1 Columns `calendar.sas7bdat`

Column name	Column label	Description	Length	Type	Format	Informat	Sample Value
DATE	Date	Day of year	8	Num	NLDATEM14.	NLDAT E20..	10FEB20081
UTIL_LOC_DIM_RK	Util Loc Dim Key	Row of utility in utility table	8	Num	12.	12.	2
UTIL_LOC_CD	Util Loc	Location of utility	20	Char	\$20.	\$20.	CT
HOLIDAY	Holiday	Holiday identifier	8	Num	BEST12.	12.	8
BEFORE_HOLIDAY	Before Holiday	Before-holiday identifier	8	Num	BEST12.	12.	109
AFTER_HOLIDAY	After Holiday	After-holiday identifier	8	Num	BEST12.	12.	209
YEAR	Year	year	8	Num	BEST12.	12.	2008
MONTH	Month	month	8	Num	BEST12.	12.	2
DAY	Day	day	8	Num	BEST12.	12.	30
WEEKDAY	Weekday	weekday identifier	8	Num	BEST12.	12.	3

This figure shows a sample calendar table.

Figure 24.1 Sample Calendar Table

	Date	Util Loc Dim Key	Util Loc	Holiday	Before Holiday	After Holiday	Year	Month	Day	Weekday
1	01/01/2003	1 CT	CT	1	0	0	2003	1	1	4
2	01/02/2003	1 CT	CT	0	0	201	2003	1	2	5
3	01/03/2003	1 CT	CT	0	0	0	2003	1	3	6
4	01/04/2003	1 CT	CT	0	0	0	2003	1	4	7
5	01/05/2003	1 CT	CT	0	0	0	2003	1	5	1
6	01/06/2003	1 CT	CT	0	0	0	2003	1	6	2
7	01/07/2003	1 CT	CT	0	0	0	2003	1	7	3
8	01/08/2003	1 CT	CT	0	0	0	2003	1	8	4
9	01/09/2003	1 CT	CT	0	0	0	2003	1	9	5
10	01/10/2003	1 CT	CT	0	0	0	2003	1	10	6
11	01/11/2003	1 CT	CT	0	0	0	2003	1	11	7
12	01/12/2003	1 CT	CT	0	0	0	2003	1	12	1
13	01/13/2003	1 CT	CT	0	0	0	2003	1	13	2
14	01/14/2003	1 CT	CT	0	0	0	2003	1	14	3
15	01/15/2003	1 CT	CT	0	0	0	2003	1	15	4
16	01/16/2003	1 CT	CT	0	0	0	2003	1	16	5
17	01/17/2003	1 CT	CT	0	0	0	2003	1	17	6
18	01/18/2003	1 CT	CT	0	0	0	2003	1	18	7
19	01/19/2003	1 CT	CT	0	0	0	2003	1	19	1
20	01/20/2003	1 CT	CT	0	0	0	2003	1	20	2
21	01/21/2003	1 CT	CT	0	0	0	2003	1	21	3
22	01/22/2003	1 CT	CT	0	0	0	2003	1	22	4
23	01/23/2003	1 CT	CT	0	0	0	2003	1	23	5
24	01/24/2003	1 CT	CT	0	0	0	2003	1	24	6
25	01/25/2003	1 CT	CT	0	0	0	2003	1	25	7
26	01/26/2003	1 CT	CT	0	0	0	2003	1	26	1
27	01/27/2003	1 CT	CT	0	0	0	2003	1	27	2
28	01/28/2003	1 CT	CT	0	0	0	2003	1	28	3
29	01/29/2003	1 CT	CT	0	0	0	2003	1	29	4
30	01/30/2003	1 CT	CT	0	0	0	2003	1	30	5
31	01/31/2003	1 CT	CT	0	0	0	2003	1	31	6
32	02/01/2003	1 CT	CT	0	0	0	2003	2	1	7
33	02/02/2003	1 CT	CT	0	0	0	2003	2	2	1
34	02/03/2003	1 CT	CT	0	0	0	2003	2	3	2
35	02/04/2003	1 CT	CT	0	0	0	2003	2	4	3
36	02/05/2003	1 CT	CT	0	0	0	2003	2	5	4
37	02/06/2003	1 CT	CT	0	0	0	2003	2	6	5
38	02/07/2003	1 CT	CT	0	0	0	2003	2	7	6
39	02/08/2003	1 CT	CT	0	0	0	2003	2	8	7
40	02/09/2003	1 CT	CT	0	0	0	2003	2	9	1
41	02/10/2003	1 CT	CT	0	0	0	2003	2	10	2
42	02/11/2003	1 CT	CT	0	0	0	2003	2	11	3
43	02/12/2003	1 CT	CT	0	0	0	2003	2	12	4
44	02/13/2003	1 CT	CT	0	0	0	2003	2	13	5
45	02/14/2003	1 CT	CT	0	0	0	2003	2	14	6
46	02/15/2003	1 CT	CT	0	0	0	2003	2	15	7
47	02/16/2003	1 CT	CT	0	0	0	2003	2	16	1
48	02/17/2003	1 CT	CT	0	0	0	2003	2	17	2
49	02/18/2003	1 CT	CT	0	0	0	2003	2	18	3
50	02/19/2003	1 CT	CT	0	0	0	2003	2	19	4
51	02/20/2003	1 CT	CT	0	0	0	2003	2	20	5
52	02/21/2003	1 CT	CT	0	0	0	2003	2	21	6
53	02/22/2003	1 CT	CT	0	0	0	2003	2	22	7
54	02/23/2003	1 CT	CT	0	0	0	2003	2	23	1
55	02/24/2003	1 CT	CT	0	0	0	2003	2	24	2
56	02/25/2003	1 CT	CT	0	0	0	2003	2	25	3
57	02/26/2003	1 CT	CT	0	0	0	2003	2	26	4
58	02/27/2003	1 CT	CT	0	0	0	2003	2	27	5
59	02/28/2003	1 CT	CT	0	0	0	2003	2	28	6
60	02/29/2003	1 CT	CT	0	0	0	2003	2	29	7
61	02/01/2004	1 CT	CT	0	0	0	2004	2	1	1
62	02/02/2004	1 CT	CT	0	0	0	2004	2	2	2
63	02/03/2004	1 CT	CT	0	0	0	2004	2	3	3
64	02/04/2004	1 CT	CT	0	0	0	2004	2	4	4
65	02/05/2004	1 CT	CT	0	0	0	2004	2	5	5
66	02/06/2004	1 CT	CT	0	0	0	2004	2	6	6
67	02/07/2004	1 CT	CT	0	0	0	2004	2	7	7
68	02/08/2004	1 CT	CT	0	0	0	2004	2	8	1
69	02/09/2004	1 CT	CT	0	0	0	2004	2	9	2
70	02/10/2004	1 CT	CT	0	0	0	2004	2	10	3
71	02/11/2004	1 CT	CT	0	0	0	2004	2	11	4
72	02/12/2004	1 CT	CT	0	0	0	2004	2	12	5
73	02/13/2004	1 CT	CT	0	0	0	2004	2	13	6
74	02/14/2004	1 CT	CT	0	0	0	2004	2	14	7
75	02/15/2004	1 CT	CT	0	0	0	2004	2	15	1
76	02/16/2004	1 CT	CT	0	0	0	2004	2	16	2
77	02/17/2004	1 CT	CT	0	0	0	2004	2	17	3
78	02/18/2004	1 CT	CT	0	0	0	2004	2	18	4
79	02/19/2004	1 CT	CT	0	0	0	2004	2	19	5
80	02/20/2004	1 CT	CT	0	0	0	2004	2	20	6
81	02/21/2004	1 CT	CT	0	0	0	2004	2	21	7
82	02/22/2004	1 CT	CT	0	0	0	2004	2	22	1
83	02/23/2004	1 CT	CT	0	0	0	2004	2	23	2
84	02/24/2004	1 CT	CT	0	0	0	2004	2	24	3
85	02/25/2004	1 CT	CT	0	0	0	2004	2	25	4
86	02/26/2004	1 CT	CT	0	0	0	2004	2	26	5
87	02/27/2004	1 CT	CT	0	0	0	2004	2	27	6
88	02/28/2004	1 CT	CT	0	0	0	2004	2	28	7
89	02/29/2004	1 CT	CT	0	0	0	2004	2	29	1
90	02/01/2005	1 CT	CT	0	0	0	2005	2	1	2
91	02/02/2005	1 CT	CT	0	0	0	2005	2	2	3
92	02/03/2005	1 CT	CT	0	0	0	2005	2	3	4
93	02/04/2005	1 CT	CT	0	0	0	2005	2	4	5
94	02/05/2005	1 CT	CT	0	0	0	2005	2	5	6
95	02/06/2005	1 CT	CT	0	0	0	2005	2	6	7
96	02/07/2005	1 CT	CT	0	0	0	2005	2	7	1
97	02/08/2005	1 CT	CT	0	0	0	2005	2	8	2
98	02/09/2005	1 CT	CT	0	0	0	2005	2	9	3
99	02/10/2005	1 CT	CT	0	0	0	2005	2	10	4
100	02/11/2005	1 CT	CT	0	0	0	2005	2	11	5
101	02/12/2005	1 CT	CT	0	0	0	2005	2	12	6
102	02/13/2005	1 CT	CT	0	0	0	2005	2	13	7
103	02/14/2005	1 CT	CT	0	0	0	2005	2	14	1
104	02/15/2005	1 CT	CT	0	0	0	2005	2	15	2
105	02/16/2005	1 CT	CT	0	0	0	2005	2	16	3
106	02/17/2005	1 CT	CT	0	0	0	2005	2	17	4
107	02/18/2005	1 CT	CT	0	0	0	2005	2	18	5
108	02/19/2005	1 CT	CT	0	0	0	2005	2	19	6
109	02/20/2005	1 CT	CT	0	0	0	2005	2	20	7
110	02/21/2005	1 CT	CT	0	0	0	2005	2	21	1
111	02/22/2005	1 CT	CT	0	0	0	2005	2	22	2
112	02/23/2005	1 CT	CT	0	0	0	2005	2	23	3
113	02/24/2005	1 CT	CT	0	0	0	2005	2	24	4
114	02/25/2005	1 CT	CT	0	0	0	2005	2	25	5
115	02/26/2005	1 CT	CT	0	0	0	2005	2	26	6
116	02/27/2005	1 CT	CT	0	0	0	2005	2	27	7
117	02/28/2005	1 CT	CT	0	0	0	2005	2	28	1
118	02/29/2005	1 CT	CT	0	0	0	2005	2	29	2
119	02/01/2006	1 CT	CT	0	0	0	2006	2	1	3
120	02/02/2006	1 CT	CT	0	0	0	2006	2	2	4
121	02/03/2006	1 CT	CT	0	0	0	2006	2	3	5
122	02/04/2006	1 CT	CT	0	0	0	2006	2	4	6
123	02/05/2006	1 CT	CT	0	0	0	2006	2	5	7
124	02/06/2006	1 CT	CT	0	0	0	2006	2	6	1
125	02/07/2006	1 CT	CT	0	0	0	2006	2	7	2
126	02/08/2006	1 CT	CT	0	0	0	2006	2	8	3
127	02/09/2006	1 CT	CT	0	0	0	2006	2	9	4
128	02/10/2006	1 CT	CT	0	0	0	2006	2	10	5
129	02/11/2006	1 CT	CT	0	0	0	2006	2	11	6
130	02/12/2006	1 CT	CT	0	0	0	2006	2	12	7
131	02/13/2006	1 CT	CT	0	0	0	2006	2	13	1
132	02/14/2006	1 CT	CT	0	0	0	2006	2	14	2
133	02/15/2006	1 CT	CT	0	0	0	2006	2	15	3
134	02/16/2006	1 CT	CT	0	0	0	2006	2	16	4
135	02/17/2006	1 CT	CT	0	0	0	2006	2	17	5
136	02/18/2006	1 CT	CT	0	0	0	2006	2	18	6
137	02/19/2006	1 CT	CT	0	0	0	2006	2	19	7
138	02/20/2006	1 CT	CT	0	0	0	2006	2	20	1
139	02/21/2006	1 CT	CT	0	0	0	2006	2	21	2
140	02/22/2006	1 CT	CT	0	0	0	2006	2	22	3
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Special Day	Description
5	Independence Day
105	Day before Independence Day
205	Day after Independence Day
6	Labor Day
106	Day before Labor Day
206	Day after labor Day
7	Columbus Day
107	Day before Columbus Day
207	Day after Columbus Day
8	Veteran's Day
108	Day before Veteran's Day
208	Day after Veteran's Day
9	Thanksgiving
109	Day before Thanksgiving
209	Day after Thanksgiving
10	Christmas
110	Christmas Eve
210	Day after Christmas

Economic Table

The economic table, `economy_data.sas7bdat`, is used for medium- and long-term forecasting, not for short- or very short-term forecasting. Data in the economic table is for the economic variable that is used to automatically generate multiple economic scenarios. Typically, this is a gross product index for local, state, or the nation. Major economic forecast vendors can typically supply a baseline forecast and as many as six scenarios.

The table should satisfy these criteria:

- be provided at the daily grain. If you have only monthly data, you must convert it to daily for input to SAS Energy Forecasting.
- provide a minimum of 1 (GROSS_PRODUCT_S0_AMT) and a maximum of 7 values (GROSS_PRODUCT_S1_AMT to GROSS_PRODUCT_S6_AMT). Leave columns blank that are not used.
- contain projected values for up to 50 years into the future. The number of future years provided should match the desired forecast horizon.

Note: The economic table can contain only one baseline forecast of a single economic variable and as many as six scenarios. Other economic variables can be added as

user-defined variables but automatic scenario generation will not be possible. Each of the columns Economic Scn 1 through Economic Scn 6 represents a different scenario. Leave higher-numbered columns blank if you have no data for that scenario. For example, if you have two economic values, then provide data for columns Economic Base and Economic Scn 1 and leave the remaining columns blank.

Table 24.3 Columns in Economic Table

Column name	Column label	Description	Length	Type	Format	Informat	Sample Value
UTIL_LOC_DIM_RK	Util Loc Dim Key	Record number of the utility in the table UTIL_LOC_DIM. See “Utility Table” on page 170.	8	Num	12.	12.	1
ECONOMY_DT	Date	Date of measurement	8	Num	NLDATEM14.	NLDAT E20.	Jan 1, 1977
UTIL_LOC_CD	Util Loc	Utility Identifier Record number of the utility in the table UTIL_LOC_DIM. See “Utility Table” on page 170.	8	Num	12.	12.	CT
GROSS_PRODUCT_S0_A MT	Economic Base	Economic or Customer Count information Record number of the utility in the table UTIL_LOC_DIM. See “Utility Table” on page 170.	8	Num	NLNUM15.3	NLNUM 15.3	330.363
GROSS_PRODUCT_S1_A MT	Economic Scn 1	Economic or Customer Count information, Scenario 1	8	Num	NLNUM15.3	NLNUM 15.3	234.283
GROSS_PRODUCT_S2_A MT	Economic Scn 2	Economic or Customer Count information, Scenario 2	8	Num	NLNUM15.3	NLNUM 15.3	330.363
GROSS_PRODUCT_S3_A MT	Economic Scn 3	Economic or Customer Count information, Scenario 3	8	Num	NLNUM15.3	NLNUM 15.3	330.363

Column name	Column label	Description	Length	Type	Format	Informat	Sample Value
GROSS_PRODUCT_S4_A MT	Economic Scn 4	Economic or Customer Count information, Scenario 4	8	Num	NLNUM15.3	NLNUM15.3	234.283
GROSS_PRODUCT_S5_A MT	Economic Scn 5	Economic or Customer Count information, Scenario 5	8	Num	NLNUM15.3	NLNUM15.3	0.000
GROSS_PRODUCT_S6_A MT	Economic Scn 6	Economic or Customer Count information, Scenario 6	8	Num	NLNUM15.3	NLNUM15.3	0.000

This figure shows a sample economic table: economy_data.

Figure 24.2 Sample Economic Table

	Util Loc Dim Key	Date	Util Loc	Economic Base	Economic Scn 1	Economic Scn 2	Economic Scn 3	Economic Scn 4	Economic Scn 5	Economic Scn 6
1	1	Jan 1, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
2	1	Jan 2, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
3	1	Jan 3, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
4	1	Jan 4, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
5	1	Jan 5, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
6	1	Jan 6, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
7	1	Jan 7, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
8	1	Jan 8, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
9	1	Jan 9, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
10	1	Jan 10, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
11	1	Jan 11, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
12	1	Jan 12, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
13	1	Jan 13, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
14	1	Jan 14, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
15	1	Jan 15, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
16	1	Jan 16, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
17	1	Jan 17, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
18	1	Jan 18, 1977	CT	330.363	330.363	0.000	0.000	0.000	0.000	0.000
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Load Table

The load table, load_data.sas7bdat, contains data on actual utility loads from the past that can be used for forecasting. The table satisfy these criteria:

- Be provided at the hourly grain for handling sub-hourly grains.
- Have at a minimum three years of history, up to 15 years if possible.

Table 24.4 Columns in Load Table

Column name	Column label	Description	Length	Type	Format	Informat	Sample Value
UTIL_LOC_DIM_RK	Util Loc Dim Key	Record number of the utility in the table UTIL_LOC_DIM. See “Utility Table” on page 170.	8	Num	12.	12.	1
LOAD_DTTM	Datetime	Date and Time of reading	8	Num	NLDATM21.	NLDATM21.	06Jul1961:08:00:00
UTIL_LOC_CD	Util Loc	Utility Identifier	30	Char	\$30.	\$30.	CT
LOAD_DT	Date	Month and Day of reading	8	Num	NLDATEM14.	NLDATE20.	0719
LOAD_HR_NO	Hour Ending	Hour of reading	8	Num	BEST12.	12.	23
LOAD_MW_NO	MW	The load reading	8	Num	BEST12.	12.	3935

This figure shows a sample load table: load_data.

Figure 24.3 Sample Load Table

	Util Loc Dim Key	Datetime	Util Loc	Date	Hour Ending	MW
1	1	01Mar2003:01:00:00	CT	Mar 1, 2003	1	3386
2	1	01Mar2003:02:00:00	CT	Mar 1, 2003	2	3258
3	1	01Mar2003:03:00:00	CT	Mar 1, 2003	3	3189
4	1	01Mar2003:04:00:00	CT	Mar 1, 2003	4	3157
5	1	01Mar2003:05:00:00	CT	Mar 1, 2003	5	3166
6	1	01Mar2003:06:00:00	CT	Mar 1, 2003	6	3255
7	1	01Mar2003:07:00:00	CT	Mar 1, 2003	7	3430
8	1	01Mar2003:08:00:00	CT	Mar 1, 2003	8	3684
9	1	01Mar2003:09:00:00	CT	Mar 1, 2003	9	3977
10	1	01Mar2003:10:00:00	CT	Mar 1, 2003	10	4129
11	1	01Mar2003:11:00:00	CT	Mar 1, 2003	11	4137
12	1	01Mar2003:12:00:00	CT	Mar 1, 2003	12	4053
13	1	01Mar2003:13:00:00	CT	Mar 1, 2003	13	3935
14	1	01Mar2003:14:00:00	CT	Mar 1, 2003	14	3850
15	1	01Mar2003:15:00:00	CT	Mar 1, 2003	15	3804
16	1	01Mar2003:16:00:00	CT	Mar 1, 2003	16	3799
17	1	01Mar2003:17:00:00	CT	Mar 1, 2003	17	
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Typical Weather Year Table

The typical weather table, `typical_wthr_data.sas7bdat`, contains a year of weather data to be used for medium-term/long-term point forecasting.

Note: The “typical” year provided can be either a leap year or not a leap year (as can the forecast period). The system automatically adjusts for leap years. However, whatever year you provide must be a valid year (for example, no missing days or extra days).

Table 24.5 Columns in `typical_wthr_data.sas7bdat`

Column name	Column label	Description	Length	Type	Format	Informat	Sample Value
WTHR_LOC_CD	Wthr Station	Weather station identifier	20	Char			KBDL
WTHR_TYPER_CD	Wthr Variable	Type of variable	10	Char			TEMPF
WTHR_NR_NO	Hour Ending	Hour ending	8	Num			1
WTHR_LOC_DIM_RK	Wthr Loc Dim Key	Location of weather station	8	Num	12.	12.	1
WTHR_DTTM	Datetime	Datetime of weather observation	8	Num	NLDATM21.	NLDATM21.	01Jan2009:01:00:00
WTHR_DT	Date	Date of observation	8	Num	NLDATEM.	NLDATEM.	Jan 1, 2009
WTHR_NO	Wthr Value	Weather value	8	Num			7

This figure shows a sample typical_wthr_data table.

Figure 24.4 Sample typical_wthr_data Table

	Wthr Station	Wthr Variable	Hour Ending	Wthr Loc Dim Key	Datetime	Date	Wthr Value
420769	KBDL	TEMPF	1	1	01Jan2009:01:00:00	01/01/2009	7
420770	KBDL	TEMPF	2	1	01Jan2009:02:00:00	01/01/2009	6
420771	KBDL	TEMPF	3	1	01Jan2009:03:00:00	01/01/2009	5
420772	KBDL	TEMPF	4	1	01Jan2009:04:00:00	01/01/2009	5
420773	KBDL	TEMPF	5	1	01Jan2009:05:00:00	01/01/2009	5
420774	KBDL	TEMPF	6	1	01Jan2009:06:00:00	01/01/2009	5
420775	KBDL	TEMPF	7	1	01Jan2009:07:00:00	01/01/2009	5
4274708	KORH	TEMPF	20	7	31Dec2009:20:00:00	12/31/2009	25
4274709	KORH	TEMPF	21	7	31Dec2009:21:00:00	12/31/2009	24
4274710	KORH	TEMPF	22	7	31Dec2009:22:00:00	12/31/2009	24
4274711	KORH	TEMPF	23	7	31Dec2009:23:00:00	12/31/2009	24
4274712	KORH	TEMPF	24	7	01Jan2010:00:00:00	12/31/2009	24

User-Defined Data Table

The user-defined data table, `user_defined_data.sas7bdat`, contains additional, user-defined variables as independent variables/effects in the prediction process. For example, you can include variables for humidity and customer counts. Additional variables are added by increasing the number of rows rather than by increasing the number of columns.

For more information, see [Chapter 26, “Add Additional Variables as Parameters,”](#) on page 183.

Table 24.6 Columns in `user_defined_data.sas7bdat`

Column name	Column label	Description	Length	Type	Format	Informat	Sample Value
UTIL_LOC_DIM_RK	Util Loc Dim Key	Row of utility in utility table	8	Num	12.	12.	2
UD_TYPE_C OL_NM	Defined Variable Name	Name of variable	32	Char	\$32.	\$32.	humidity
UD_DTTM	Datetime	Date and Time of reading	8	Num	NLDATM21.	NLDATM21.	06Jul1961:08:00:00
UTIL_LOC_CD	Util Loc	Location of utility	20	Char	\$20.	\$20.	CT

Column name	Column label	Description	Length	Type	Format	Informat	Sample Value
UD_TYPE_CD	Defined Variable	Type of variable. Valid values are: CLASS MODEL	8	Char	\$10.	\$10.	MODEL
UD_DT	Date	Day of year	8	Num	NLDATEM14	NLDATE20..	10FEB20081
UD_HR_NO	Hour Ending	Hour of reading	8	Num	BEST12.	12.	23
UD_NO	Def Value	Numeric value of the variable	8	Num	BEST12.	12.	72.45

This figure shows a sample user_defined_data table.

Figure 24.5 Sample user_defined_data Table

	Util Loc Dim Key	Defined Variable Name	Datetime	Util Loc	Defined Variable	Date	Hour Ending	Def Value
1	1	HUMIDITY	05Jan2016:01:00:00	CT	MODEL	01/05/2016	1	0.38
2	1	HUMIDITY	05Jan2016:02:00:00	CT	MODEL	01/05/2016	2	0.42
3	1	POPULATION	05Jan2016:01:00:00	CT	MODEL	01/05/2016	1	340000
4	1	POPULATION	05Jan2016:02:00:00	CT	MODEL	01/05/2016	2	340006
5	1	WEEK	05Jan2016:01:00:00	CT	CLASS	01/05/2016	1	14
6	1	WEEK	05Jan2016:02:00:00	CT	CLASS	01/05/2016	2	14

Notice that additional variables are added by increasing the number of rows rather than by increasing the number of columns.

Utility Table

The utility table, util_loc_dim.sas7bdat, contains the list of utilities.

Table 24.7 Columns in util_loc_dim.sas7bdat

Column name	Column label	Description	Length	Type	Format	Informat	Sample Value
UTIL_LOC_DIM_RK	Util Loc Dim Key	Key field for this table	8	Num	12.	12.	1
UTIL_LOC_CD	Util Loc	ID of the utility	20	Char	\$30.	\$30.	MASS
UTIL_LOC_NM	Util Loc Name	Name of the utility	60	Char	\$60.	\$60.	Massachusetts

Column name	Column label	Description	Length	Type	Format	Informat	Sample Value
UTIL_LOC_DESC	Util Loc Description	Description of the utility	150	Char	\$150.	\$150.	Massachusetts region
PARENT_UTIL_LOC_CD	Parent Util Loc	ID of the parent utility	30	Char	\$30.	\$30.	NE
UTIL_LEVEL_TYPE_RK	Util Level Type Key	Type of level	8	Num	12.	12.	1
LONGITUDE_NO	Util Loc Longitude	Longitude of the utility	8	Num	BEST12.	12.	123
LATITUDE_NO	Util Loc Latitude	Latitude of the utility	8	Num	BEST12.	12.	123

This figure shows a sample utility table: util_loc_dim.

Figure 24.6 Sample Utility Table

Util Loc Dim Key	Util Loc	Util Loc Name	Util Loc Desc	Parent Util Loc	Util Level Type Key	Util Loc Longitude	Util Loc Latitude
1	CT	Connecticut	Connecticut zone	NEISO	.	.	.
2	MASS	Massachusetts	Massachusetts region	NEISO	.	.	.
3	ME	Maine	Maine zone	NEISO	.	.	.
4	NEISO	New England ISO	New England ISO Company		.	.	.
5	NEMASSBO	NE Mass and Boston	Massachusetts and Boston zone	MASS	.	.	.
6	NH	New Hampshire	New Hampshire zone	NEISO	.	.	.
7	RI	Rhode Island	Rhode Island zone	NEISO	.	.	.
8	SEMASS	SE Mass	Southeast Massachusetts zone	MASS	.	.	.
9	VT	Vermont	Vermont zone	NEISO	.	.	.
10	WCMASS	Western and Central Mass	Western and Central Massachusetts zone	MASS	.	.	.

Utility/Weather Crossing Table

The utility/weather crossing table, util_loc_x_wthr_loc.sas7bdat, maps the utility location to its associated weather station.

Note: Currently, the only valid value for Wthr Station Weight is 100 (100%).

Table 24.8 Columns in util_loc_x_wthr_loc.sas7bdat

Column name	Column label	Description	Length	Type	Format	Informat	Sample Value
UTIL_LOC_DIM_RK	Util Loc Dim Key	Key field for this table	8	Num	12.	12.	1

Column name	Column label	Description	Length	Type	Format	Informat	Sample Value
WTHR_LOC_DIM_RK	Wthr Loc Dim Key	Key field for this table	8	Num	12.	12.	1
UTIL_LOC_CD	Util Loc	ID of the utility	20	Char	\$30.	\$30.	MASS
WTHR_LOC_CD	Wthr Station	ID of the weather station	30	Char	\$30.	\$30.	KPWM
UTIL_WTHR_WEIGHT_RT	Wthr Station Weight	Percentweight to give to this station	8	Num	NLNUM9.4	NLNUM9.4	100

This figure shows a sample util_loc_x_wthr_loc table.

Figure 24.7 Sample util_loc_x_wthr_loc Table

	Util Loc Dim Key	Wthr Loc Dim Key	Util Loc	Wthr Station	Wthr Station Weight
1	1	1	CT	KBDL	100.0000
2	2	8	MASS	KMASS	100.0000
3	3	2	ME	KPWM	100.0000
4	4	9	NEISO	KNEISO	100.0000
5	5	3	NEMASSBOST	KBOS	100.0000
6	6	4	NH	KCON	100.0000
7	7	5	RI	KPVD	100.0000
8	8	5	SEMASS	KPVD	100.0000
9	9	6	VT	KBTV	100.0000
10	10	7	WCMASS	KORH	100.0000

Weather Station Table

The weather station table, wthr_loc_dim.sas7bdat, contains the list of weather stations.

Table 24.9 Columns in wthr_loc_dim.sas7bdat

Column name	Column label	Description	Length	Type	Format	Informat	Sample Value
WTHR_LOC_DIM_RK	Wthr Loc Dim Key	Key field for this table	8	Num	12.	12.	1
WTHR_LOC_CD	Wthr Station	ID of the weather station	30	Char	\$30.	\$30.	KPWM
WTHR_LOC_NM	Weather Station Name	Name of the weather station	60	Char	\$60.	\$60.	Logan Int Airport

Column name	Column label	Description	Length	Type	Format	Informat	Sample Value
WTHR_LOC_DESC	Wthr Station Desc	Description of the weather station	150	Char	\$150.	\$150.	Boston Logan International Airport 1 Harborside Dr Boston MA
PARENT_WTHR_LOC_CD	Rollup Wthr Station	ID of the parent utility	30	Char	\$30.	\$30.	NE
LONGITUDE_NO	Wthr Station Longitude	Longitude of the weather station	8	Num	BEST12.	12.	123
LATITUDE_NO	Wthr Station Latitude	Latitude of the weather station	8	Num	BEST12.	12.	123

This figure shows a sample weather stations table: wthr_loc_dim.

	Wthr Loc Dim Key	Wthr Station	Wthr Station Name	Wthr Station Desc	Rollup Wthr Station	Wthr Station Longitude	Wthr Station Latitude
1	1	KBDL	Bradley Int Airport	Bradley International Airport Schoephoester Rd Windsor Locks CT		.	.
2	2	KPWM	Portland Int Airport	Portland International Jetport 1001 Westbrook St Portland ME		.	.
3	3	KBOS	Logan Int Airport	Boston Logan International Airport 1 Harborside Dr Boston MA		.	.
4	4	KCON	Concord Municipal Airport	Concord Municipal Airport Concord New Hampshire		.	.
5	5	KPVD	TF Green Airport	T. F. Green Airport 2000 Post Rd Warwick RI		.	.
6	6	KBTV	Burlington Int Airport	Burlington International Airport Burlington VT		.	.
7	7	KORH	Worcester Regional Airport	Worcester Regional Airport 375 Airport Dr Worcester MA		.	.
8	8	KMASS	Massachusetts region	Mean of KBOS KPVD and KORH		.	.
9	9	KNEISO	New England Company	Mean of all New England weather stations		.	.

Weather Data Table

The weather data table, wthr_data.sas7bdat, is used as a source data for load forecasting. The temperature data can be several types of data such as Fahrenheit and Centigrade. The type is specified in the field WTHR_TYPE_CD.

For short-term and very short-term forecasts, the weather data table contains historic weather data. It also contains forecasted weather data for the period being forecast to be used as input to the forecast.

Table 24.10 Columns in wthr_data.sas7bdat

Column name	Column label	Description	Length	Type	Format	Informat	Sample Value
WTHR_LOC_DIM_RK	Wthr Loc Dim Key	Record number of the utility in the table UTIL_LOC_DIM	8	Num	12.	12.	1

Column name	Column label	Description	Length	Type	Format	Informat	Sample Value
WTHR_TYPE_CD	Wthr Variable	The type of data contained in the column WTHR_NO	15	Char	\$15.	\$15.	TEMPF
WTHR_DTTM	Datetime	Date and Time of reading	8	Num	NLDATM21.	NLDATM21.	06Jul1961:08:00:00
WTHR_LOC_CD	Wthr Station	Weather station Identifier	30	Char	\$30.	\$30.	TEMPF
WTHR_DT	Date	Month and Day of reading	8	Num	NLDATEM14.	NLDATE20.	0719
WTHR_HR_NO	Hour Ending	Hour of reading	8	Num	BEST12.	12.	23
WTHR_NO	Wthr Value	The reading (for example, Fahrenheit temperature or Centigrade temperature)	8	Num	BEST12.	12.	72

This figure shows a sample weather table: wthr_data.

Figure 24.8 Sample Weather Table

	Hour Ending	Wthr Loc Dim Key	Wthr Variable	Datetime	Wthr Station	Date	Wthr Value
1	1	1	TEMPF	01Jan1961:01:00:00	KBDL	01/01/61	19
2	2	1	TEMPF	01Jan1961:02:00:00	KBDL	01/01/61	21
3	3	1	TEMPF	01Jan1961:03:00:00	KBDL	01/01/61	23
4	4	1	TEMPF	01Jan1961:04:00:00	KBDL	01/01/61	24
5	5	1	TEMPF	01Jan1961:05:00:00	KBDL	01/01/61	25
6	6	1	TEMPF	01Jan1961:06:00:00	KBDL	01/01/61	26
7	7	1	TEMPF	01Jan1961:07:00:00	KBDL	01/01/61	27
8	8	1	TEMPF	01Jan1961:08:00:00	KBDL	01/01/61	28
9	9	1	TEMPF	01Jan1961:09:00:00	KBDL	01/01/61	30
10	10	1	TEMPF	01Jan1961:10:00:00	KBDL	01/01/61	31
11	11	1	TEMPF	01Jan1961:11:00:00	KBDL	01/01/61	32
12	12	1	TEMPF	01Jan1961:12:00:00	KBDL	01/01/61	34
13	13	1	TEMPF	01Jan1961:13:00:00	KBDL	01/01/61	34
14	14	1	TEMPF	01Jan1961:14:00:00	KBDL	01/01/61	
15	15	1	TEMPF	01Jan1961:15:00:00	KBDL	01/01/61	

Chapter 25

Manage Permissions

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Overview

As an administrator, you create users, roles, and groups. In general, here is the sequence of the tasks:

1. Create roles.
For more information, see [“Roles” on page 176](#).
2. Create groups.
For more information, see [“Groups” on page 178](#).
3. Create users and assign them to groups.
For more information, see [“Users” on page 179](#).

Note: You can limit the reach and activities of a SAS server by putting it in a locked-down state. When the server is in a locked down state, SAS Energy Forecasting allows only a limited view of the server file system. For more information, see *SAS 9.4 Intelligence Platform: Security Administration Guide* at <http://support.sas.com/documentation/onlinedoc/intellplatform/>.

Roles

Overview

A role is a set of capabilities. When you make a group be a member of a role, users who are members of that group inherit the capabilities of the role.

There are four groups of capabilities associated with SAS Energy Forecasting.

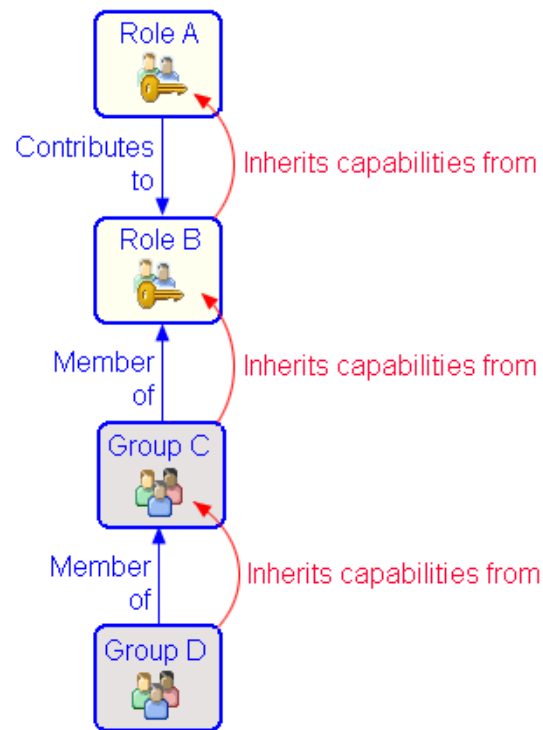
Table 25.1 Roles and Capabilities

Role	Capabilities
Forecaster	Create Diagnose Definition Update Diagnose Definition Run Diagnose Definition Create Forecast Definition Update Forecast Definition Run Forecast Definition
Forecast Viewer	View Diagnose Results View Forecast Results
Forecast Administrator	Delete Diagnose Definition Delete Diagnose Results Delete Forecast Definition Delete Forecast Results
General	Energy Forecasting User <i>Note:</i> This capability is a prerequisite for all the other capabilities. It is required for accessing the SAS Energy Forecasting client and for accessing SAS Visual Analytics from the SAS Energy Forecasting application.

As an administrator, you create roles with one or more capabilities. Then, when you create a group, you make the group be a member of a role so that the group inherits capabilities from the role.

[Figure 25.1 on page 177](#) summarizes the inheritance of capabilities from roles and groups:

- Role B inherits from role A because role A is a contributing role to role B.
- Group C inherits from role B because group C is a member of role B.
- Group D inherits from group C because group D is a member of group C.

Figure 25.1 Inheritance of Capabilities

Note: Inheritance of capabilities is transitive. That is, if C inherits from B, and B inherits from A, then C inherits from A.

Another way to look at the inheritance of capabilities is as one of inclusion as shown in the following figure which (assumes the Contributes to and Member of relationships in the figure above):

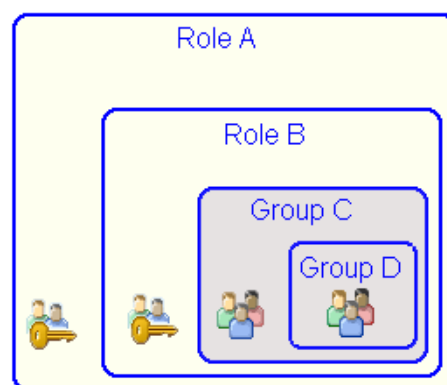
Figure 25.2 Inheritance Relationships

Figure 25.2 on page 177 indicates these points:

- Users in Role A have only the capabilities of Role A.
- Users in Role B have the capabilities of Role A and Role B.
- Users in Group C have the capabilities of Role A and Role B (and they could have whatever capabilities not pictured that Group C inherits from other roles).

- Users in Group D have the capabilities of Role A and Role B and Group C (and they could have whatever capabilities not pictured that Group D inherits from other roles or groups).

Create a Role

1. Open SAS Management Console, and connect to the metadata server.
2. On the **Plug-Ins** tab, expand **Environment Management**.
3. Right-click **User Manager**, and select **New** ⇒ **Role**.
The role Properties window appears.
4. Name the role.
5. Click the **Capabilities** tab, and then select the capabilities that you want to assign to this role—and indirectly to any group that is a member of this role.
 indicates a capability that has been explicitly assigned to a role. indicates a capability that has been inherited from a contributing role.
6. (Optional) Click the **Contributing Roles** tab, and add any roles that you want to contribute capabilities to the role being created.
7. (Optional) Click the **Authorization** tab, and add any groups or roles that you want to have authorization to access the role being created.
8. Click **OK**.

Groups

Overview

A group is a set of users who share the same capabilities. It is convenient to create groups before creating users because if groups exist, then when you create a user, you can assign the user to one or more groups and thereby determine the user's capabilities.

Creating a group is the second part of a two-step process:

1. Create roles with the capabilities that you want to assign to the group.
2. Create a group and make it a member of the roles that you created. This gives the group the capabilities of the roles.

Create a Group

1. Open SAS Management Console, and connect to the metadata server.
2. On the **Plug-Ins** tab, expand **Environment Management**.
3. Right-click **User Manager**, and select **New** ⇒ **Group**.
The group Properties window appears.
4. Name the group.

5. Click the **Groups and Roles** tab, and add the roles whose capabilities you want the group to have.

We say that the group is a member of the role. Such roles contribute their capabilities to the group. Alternatively, we can say that the group inherits its capabilities from the roles.

6. Click **OK**.

Users

Overview

When you add a user to a group, the user receives all of the capabilities of the group. If the user is a member of multiple groups, then the user has the union of the capabilities of all of the groups of which the user is a member.

Create a User

1. Open SAS Management Console, and connect to the metadata server.
2. On the **Plug-Ins** tab, expand **Environment Management**.
3. Right-click **User Manager**, and select **New** ⇒ **User**.
The user Properties window appears.
4. Enter the user's name (which is the user's SAS Energy Forecasting logon name) and the user display name.
5. Click the **Groups and Roles** tab, and add the group or groups of which the user is a member.
6. Click the **Accounts** tab, and click **New** to add a new account. Enter the user's domain and user ID.
You can leave the password blank. When the user logs on to SAS Energy Forecasting, the password that the user enters is verified against the user's password on the system.
7. Click **OK** twice.

Note: If the user is defined only on the local computer rather than in a domain, be sure to add the user to Local Users and Groups using Microsoft Management Console (with the Administrative Tool “Computer Management”).

Directory Access

Overview

Here are general principles concerning required directory access:

- Users of SAS Energy Forecasting must have Read permission to the templates directory. For more information, see [“Templates Directory” on page 180](#).
- Users of SAS Energy Forecasting must have Read permission to project directories (the directories that contain diagnoses and forecasts). For more information, see [“Project Directories” on page 180](#).
- Every user ID that is associated with SAS Energy Forecasting Server User must have Read permission to the input path for a project’s SAS input data source.
- The SAS Energy Forecasting Workspace Server must have permissions to write to the projects and archive directories.
- All users must be operating system users.

Templates Directory

By default, parameter templates are stored in `C:\SAS\Config\Lev1\SASApp\Data\EnergyForecasting\Templates`. Each user who creates or views a diagnose or forecast must have Read permission to the templates directory. For more information, see [Chapter 30, “Parameter Templates,” on page 197](#).

Project Directories

The default output folder of a project is `SAS\Config\Lev1\SASApp\Data\EnergyForecasting` with a subdirectory that is the project name. Each diagnose is created as a subdirectory of the project. Each forecast within a diagnose is a subdirectory of the diagnose.

Every user who needs to view the output of a diagnose or forecast must have at a minimum Read permission to the diagnose or forecast directory. Here are guidelines for establishing minimum permissions and extended permissions to project directories:

- Minimum permissions

For Windows or LAX, a minimal security approach is to have the Energy Forecasting Server User, any other SAS users (such as sassrv), and any additional users with capabilities in SAS Energy Forecasting belong to a group that has read write and modify access to the SAS Energy Forecasting data directory (for example, `C:\SAS\Config\Lev1\SASApp\Data\EnergyForecasting`) and any additional directories that host SAS Energy Forecasting projects.

- Extended permissions

For LAX deployments the Energy Forecasting data directory `C:\SAS\Config\Lev1\SASApp\Data\EnergyForecasting` and any additional project directories should be owned by the Energy Forecasting Server User with full control. All other users should belong to the same group as the Energy Forecasting Server User and that group should have at a minimum Read access.

For Windows, you can create multiple OS groups. For purpose of illustration, the following are three sample groups that you might create:

- SEF_GENERAL_USERS

These users need file system permissions to read from the default SAS Energy Forecasting data directory **C:\SAS\Config\Lev1\SASApp\Data\EnergyForecasting**.

- SEF_PROJECT_USERS

You can create multiple such groups with different users based on project access needs. Users in these groups need Read permission for any projects folders to which they require access.

- SEF_ADMIN_USERS

The Energy Forecasting Server User needs read / write / modify permissions to each project folder as well as the SAS Energy Forecasting data directory.

Chapter 26

Add Additional Variables as Parameters

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Overview

By default, SAS Energy Forecasting uses the load history, temperature history, and calendar data to predict what the demand load is going to be in the future. For medium/long-term forecasting, it also uses economic scenarios. However, you can include additional variables as independent variables/effects in the prediction process. For example, you can include variables for humidity, customer counts, and so on.

To include additional variables, you must perform these steps:

1. [“Supply a Data Set with the Additional Variables and Their Data” on page 183](#)
2. [“Specify the Additional Variables as Parameters in the User Interface” on page 184](#)

Supply a Data Set with the Additional Variables and Their Data

The data set containing the additional variables and their data must be a standard SAS data set named `user_defined_data`. It must contain a datetime column, and the range of dates must be consistent with other incoming data and must cover the horizon of your forecast. It can contain one or more numeric variables that are used as additional variables. For more information, see [“User-Defined Data Table” on page 169](#).

The data set must reside in the standard staging location (the same location as the input files) before running either a diagnose or forecast. For more information, see [“Input Path for SAS Input Data Source” on page 11](#).

Specify the Additional Variables as Parameters in the User Interface

There are two parameters in the user interface that you must specify to make your additional variables known to SAS Energy Forecasting:

- **Additional Modeling Variables**

This parameter appears on the **Advanced** tab of diagnose parameters. For more information, see [“Additional Modeling Variables” on page 256](#).

Separate multiple variables with a single blank. Do not use quotation marks.

Variables that you specify in this field are used in the MODEL statement of PROC GLM as independent effects. They must contain hourly data.

Note: The column name of the **Additional Modeling Variables** field in the parm_vsel table is add_var.

- **Additional Class Variables**

This parameter appears on the **Advanced** tab of parameters as **Additional Class Variables**. For more information, see [“Additional Class Variables” on page 256](#).

Separate multiple variables with a single blank. Do not use quotation marks.

Variables that you specify in this field are used in the CLASS statement of PROC GLM as additional class variables as shown in the following example:

```
proc GLM data = glm_data noprint;
  CLASS Month Weekday HE &add_class;
  MODEL load= trend Weekday*HE Month Month*t0_p1 Month*t0_p2 Month*t0_p3
            HE*t0_p1 HE*t0_p2 HE*t0_p3
            &recenty_step2_var
            &recenty_step3_var
            &add_var
  /
  p
  clm
  ss1
  ss3
  solution
  SINGULAR=1E-07;
  weight &wls_weight;
  output out=fcst_results predicted = predicted_load lclm=lower95 uclm=upper95;
run;
quit;
```

Note: The column name of the **Additional Class Variables** field in the parm_vsel table is add_class.

Chapter 27

Back Up SAS Energy Forecasting Data

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What to Back Up

When backing up SAS Energy Forecasting data, you should include the following:

- The project data path.
The project data path is the folder structure on disk used to organize the diagnose and forecasting jobs and definitions. For more information, see [“Project Data Path” on page 12](#).
- The Postgres database at C:\SAS\Config\Lev1\EnergyForecastingDataServer.
To back up the database, you need to use Postgres tools.
- Sample SAS Visual Analytics reports and reports that you have created.

Chapter 28

Work with SAP HANA

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Overview

Using SAS Energy Forecasting results data with SAP HANA involves the following steps:

1. “Configure SAS/ACCESS Interface to SAP HANA” (See page 187.)
2. “Configure SAS Metadata Server” (See page 188.)
3. “Create an SAP HANA Schema” (See page 190.)
4. “Create a LIBNAME Statement” (See page 190.)
5. “Run the Forecast” (See page 30.)

Configure SAS/ACCESS Interface to SAP HANA

1. Log on as a system administrator to the machine that you are using for accessing SAP HANA.
2. Select **Control Panel** ⇒ **System and Security** ⇒ **Administrative Tools** ⇒ **Data Sources (ODBC)**
3. Click the **System DSN** tab and click **Add**.
The Create New Data Source window appears.

4. Select **HDBODBC** as the driver for which you want to set up a data source, and click **Finish**.

An SAP HDB configuration window appears.

Note: The HDBODBC driver is installed when you install the SAP HANA client.

5. Specify this information:

- **Data Source Name**

Enter a name.

- **Description**

Enter an optional description.

- **Server Port**

The SAS Hana Server name and port have been established on installation of the SAP HANA server.

Note: The normal port number is 3xx15, where xx is the instance number that was established on installation of the SAP HANA server.

6. Click **Connect** to test your connection.

A connection dialog box appears for you to specify a **User** and **Password**.

When you click **OK**, you should receive a message that the connection was successful.

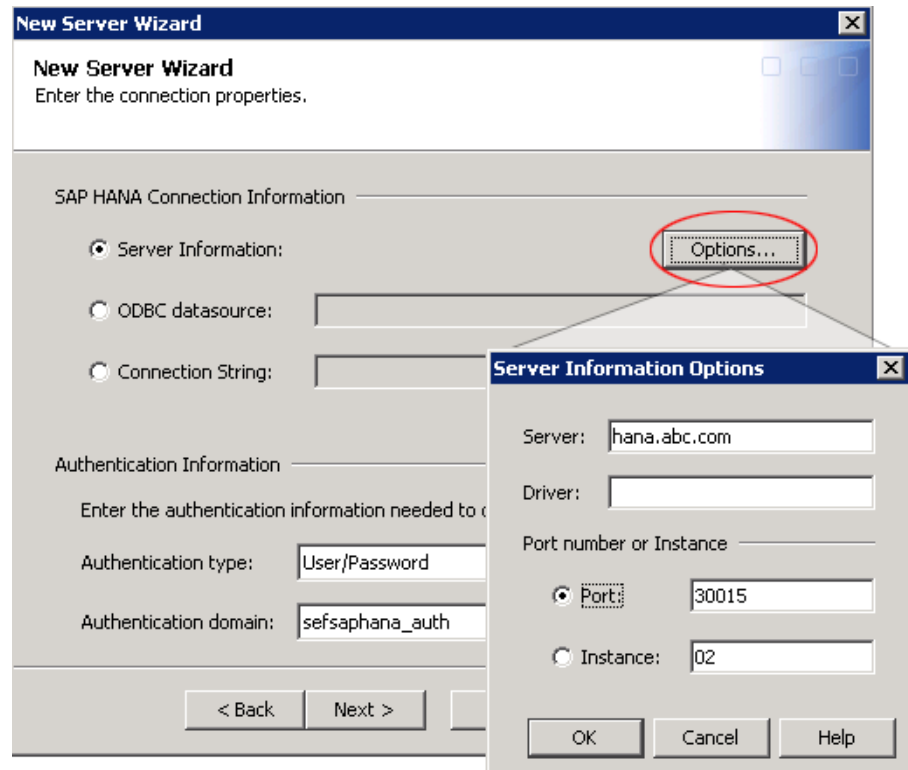
Configure SAS Metadata Server

Create a HANA Server in Metadata

1. Open SAS Management Console as administrator.
2. On the **Plug-Ins** tab, expand **Environment Management**.
3. Right-click **Server Manager**, and select **New Server**.

The New Server Wizard opens.
4. Expand **Resource Templates** ⇒ **Servers** ⇒ **Database Servers**.
5. Select **SAP HANA Server**, and click **Next**.
6. Give the server a name, and then click **Next**.
7. Specify the name of the **Associated Machine** (the machine that is hosting the SAS Metadata Server), and then click **Next**.
8. Enter the following connection properties:
 - a. Select **Server Information**, and then click **Options**.

The Server Information Options window appears.



- b. Specify the following information:
 - **Server**
Specify the machine on which the SAP HANA database is installed.
 - **Driver**
You can leave this field blank.
 - **Port**
By default, the port is 30015.
 - **Instance**
Specify your instance number, for example, 02.
- c. Click **OK**.
- d. Under **Authentication Information**, specify the following information:
 - **Authentication type**
User/Password
 - **Authentication domain**
If an authentication domain has not been defined, then click **New** to create a new authentication domain.
- e. For **Advanced Options**, you can take the defaults.

After specifying connection properties, click **Next** and then click **Finish**.

Create a Group for HANA Authorization

1. Open SAS Management Console as administrator.

2. On the **Plug-Ins** tab, expand **Environment Management**.
3. Right-click **User Manager**, and select **New** ⇒ **Group**.
The group Properties window appears.
4. Name the group.
5. Click the **Members** tab, select **Energy Forecasting Server User**, and then add it as a member of the group.
6. Click the **Accounts** tab, click **New** and then, on the New Login Properties window, specify the following information:
 - **User ID** (for HANA)
 - **Password** (for HANA)
 - **Authentication Domain** (for HANA)

Note: This must be the same authentication domain as specified in [Step 8d on page 189](#).
7. Click **OK**.

Create an SAP HANA Schema

To access SAP HANA, you need a schema for the SAP HANA database where the tables created by SAS Energy Forecasting are stored. The schema is generally created by the system or data administrator who can do so with the following code in Base SAS, SAS Enterprise Guide, or SAS Data Integration Studio (substitute the values for your SAP HANA user and password, server, instance, and schema name)

```
proc sql;
connect to SAPHANA (user=USERID password=PASSWORD
server='hana.abc.com' instance=02);
execute (create schema Schema4SEF) by SAPHANA;
disconnect from SAPHANA;
quit;
```

Create a LIBNAME Statement

Use a text editor to create a file containing a LIBNAME statement for the SAP HANA database schema. The file must have the extension `.sas` and reside anywhere on the server tier. For example: `C:\sefhana\libref.sas`.

The name and directory are your choice. You specify the name and directory as a parameter to the forecast. For more information, see “[Run the Forecast](#)” on page 30.

Here is a sample LIBNAME statement:

```
LIBNAME freport SAPHANA INSERTBUFF=30000 TABLE_TYPE=column
DBCOMMIT=30000 SERVER="rndhana.unx.sas.com" INSTANCE=02
SCHEMA=SEFSAPHANA AUTHDOMAIN="sefsaphana_auth";
```

Note:

1. The value of LIBNAME must be **freport**.

-
2. The value of AUTHDOMAIN should be the authorization domain that you specified using the SAS Management Console. For more information, see [Step 6 on page 190](#).

Chapter 29

Run Stored Processes

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Overview

A stored process is a SAS program that is stored centrally on a server. You can execute the program from the SAS Energy Forecasting client and receive and process the results. Stored processes enable you to maintain and manage code centrally and give you better control over changes.

For more information about the stored process feature of SAS Integration Technologies, see *SAS 9.4 Stored Processes: Developer's Guide* at <http://support.sas.com/documentation/cdl/en/stpug/67499/PDF/default/stpug.pdf>.

TIP There is a sample stored process that you can register and run: `C:\Program Files\SASHome\SASFoundation\9.4\enfcsvr\sasmisc\sef_export.sas`.

Register a Stored Process in Metadata

In order to use a stored process, you must use SAS Management Console to register the metadata for the stored process.

Note: Before you can register a stored process, the servers that the stored process uses must be defined. Define the servers with the Server Manager of SAS Management Console.

To register a new stored process:

1. Open SAS Management Console as administrator.
2. On the **Folders** tab, select the folder in which to create the stored process.

Note: You can create a folder by placing the cursor where you want to create the folder and selecting **New** ⇒ **Folder**.

3. Right-click the folder, and select **New** ⇒ **Stored Process**.

The New Stored Process wizard opens.

4. Name the stored process, supply any other required information, and then click **Next**.

Note: You include this name in the **program** column of the `sef_stp` file. For more information, see “[Declare the Stored Process to SAS Energy Forecasting](#)” on page 194.

The **Execution** page appears.

5. Specify this information:

- **Application server**

Specify **SASApp**, unless you have changed the server during installation.

- **Server type**

Select **Default server**.

- **Source code location and execution**

Select the following:

- **Allow execution on selected application server only**

- **Store source code on application server**

- **Source code repository**

Specify the directory for the SAS program that is the stored process.

- **Source file**

Specify the name of the SAS program.

- **Result capabilities**

Select **Stream**.

6. Specify any other information, such as parameters, to complete the metadata for the stored process.

Declare the Stored Process to SAS Energy Forecasting

In addition to registering your stored process in metadata, you must declare it to SAS Energy Forecasting. To do so, add an entry for it in the table `sef_stp` which you must place in `[installation_directory] SASApp/Data/EnergyForecasting/Templates`. There is a sample file, `sef_stp.sas7bdad`, in `C:\Program Files\SASHome\SASFoundation\9.4\enfcsvr\` that you can modify and then copy into the `Templates` directory.

This figure shows the `sef_stp` table with sample entries:

Figure 29.1 Table `sef_stp` With Sample Entries

Sef_stp						
	Stored Process Name	Description	Action Parameters	Results Type	Program Path	Additional Parameters
1	Load Weather Plot	Load Weather Plot	execute	FOUNDATION,VSTLF	/Shared Data/SEF/STP/SEF_LOAD_WEATHER_PLOT	
2	Mape Report	Mape Table and Graph	execute	FOUNDATION,VSTLF	/Shared Data/SEF/STP/SEF_MAPE_REPORT	ERROR_SCORE=mape
3	Mae Report	Mae Table and Graph	execute	FOUNDATION,VSTLF	/Shared Data/SEF/STP/SEF_MAPE_REPORT	ERROR_SCORE=mae
4	Me Report	Me Table and Graph	execute	FOUNDATION,VSTLF	/Shared Data/SEF/STP/SEF_MAPE_REPORT	ERROR_SCORE=me
5	Export Forecast	Export Forecast Results Tbl	execute	FOUNDATION,VSTLF	/Shared Data/SEF/STP/SEF_FCST_RESULTS	

The table contains these columns:

Table 29.1 Columns in `sef_stp` Table

Name	Label	Description
name	Name	The name to display in the user interface for the stored process. <i>Note:</i> This name can, but is not required to, match the stored process name registered in SAS Management Console. That name is specified in the program column.
desc	Description	The description to display in the user interface for a stored process.
action	Action Parameters	The list of actions to pass to the stored process server. Valid values are: <ul style="list-style-type: none"> form properties execute newwindow
type	Results Type	The list of diagnose or forecast types that this stored process supports. Valid support types are: <ul style="list-style-type: none"> FOUNDATION (DIAGNOSE) VSTLF STLF MTLTLF
program	Program Path	The complete path of the metadata folder of the program to call. <i>Note:</i> The path includes what is registered in SAS Management Console as the name of the stored process. For more information, see Step 4 on page 194 . <i>Note:</i> URL escaping is done automatically.
params	Additional Parameters	Any additional parameters that the stored process receives. For example: ERROR_SCORE=mape

Receive Parameters

- **BASELOC**

A character string containing the path of the parent directory of the directories containing input to and output from the procedure that produced the results file named by SOURCETABLE (for example, BASELOC=C:\ULF_T\DATA\FoundationDiagnose_1\20140710_85223\).

- **PARAMS**

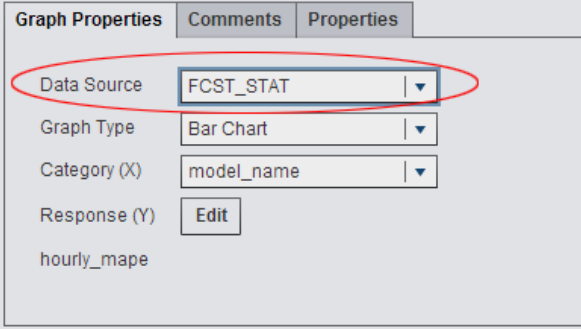
The name of the parameter file that was passed into the procedure that produced the results file named by SOURCETABLE (for example, PARAMS=parm_vsel).

- **SOURCEPATH**

The directory of the current data source being viewed from the GUI when the stored process was invoked (for example, SOURCEPATH=results. Concatenate the value of SOURCEPATH with the value of BASELOC to obtain the complete path to the directory of the table).

- **SOURCETABLE**

The name of the current data source being viewed from the GUI when the stored process was invoked (for example, SOURCETABLE=FCST_RESULTS).



The screenshot shows a dialog box titled "Graph Properties" with three tabs: "Graph Properties", "Comments", and "Properties". The "Properties" tab is selected. The dialog contains several fields and a button:

- Data Source:** A dropdown menu with "FCST_STAT" selected. This field is circled in red.
- Graph Type:** A dropdown menu with "Bar Chart" selected.
- Category (X):** A dropdown menu with "model_name" selected.
- Response (Y):** A button labeled "Edit".
- hourly_mape:** A text field.

Chapter 30

Parameter Templates

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Introduction

The parameters that are displayed in the user interface are defined in template files.

By default, the template files are located in **C:\SAS\Config\Levl\SASApp\Data\EnergyForecasting\Templates**.

CAUTION:

Do not change the template files at this location unless you want to change the default values that are displayed in the user interface for all users. Create backup files before editing. Improper editing of the template files can result in improper functioning or disablement of SAS Energy Forecasting.

Here is the schema for a template file:

Table 30.1 Schema for Template File

Column Name	Type	Description
name	Char (256)	The parameter name (for example, 'utility' or 'weight_num')
value	Char (256)	The parameter value to be used by the forecasting macros (for example, 'CT')
lbl	Char (256)	The label to be used in the UI (for example, 'Utility Code'). An attempt to look up localized string using the name parameter occurs first, if found it is used. If one does not exist, then use lbl.

Column Name	Type	Description
type	Char (20)	The parameter type, used in the UI to identify the type of input control and format (supported values: Char, num, date9)
min	num	The min value used in the UI for validation when the type is num.
max	num	The max value used in the UI for validation when the type is num
choice	Char (256)	List of choices to be presented in the UI (for example, mape has the list of choices 'hourly_mape, daily_mape, daily_peak_mape, monthly_mape, monthly_peak_mape, annual_mape, annual_peak_mape')
grp_1	Char (30)	The first order of grouping used in the UI (tab)
grp_2	Char (30)	The second order of grouping used in the UI (sub group)

These template files are supplied on installation of the product:

- “[PARM_REC](#)” on page 198
- “[PARM_VSEL](#)” on page 200
- “[PARM_VSTLF](#)” on page 203
- “[PARM_STLF](#)” on page 204
- “[PARM_MTLTLF](#)” on page 205

PARM_REC

The table `parm_rec` contains the parameters for a geographical hierarchical reconciliation. For more information, see [Chapter 17, “Forecasting a Geographical Hierarchy,”](#) on page 93.

Table 30.2 Columns in `parm_rec` Table

Name	Label	Default Value	Description
<code>rec_method_type</code>	Reconciliation Method Type	Bottom-Up	Bottom-Up or Top-Down
<code>disaggregation</code>	Disaggregation	Proportions	Proportions or Difference. This parameter applies only to top-down reconciliation and controls how the aggregation error is apportioned when doing top-down forecasts.

sefrec_init_exit	Reconciliation Initialization Exit	This parameter is optional. Specify the path and filename of a SAS program or macro that SAS Energy Forecasting invokes before the reconciliation is run. For example: C:\sef_reconcile\init.sas.
sefrec_term_exit	Reconciliation Completion Exit	This parameter is optional. Specify the path and filename of a SAS program or macro that SAS Energy Forecasting will invoke after the reconciliation finishes. For example: C:\sef_reconcile\terminate.sas.
utility		Specify the high-level zone to be reconciled (for example, NEISO).
numnodes		Specify the number of zones in the hierarchy (including the topmost one specified by the utility variable).
node1		Specify the ID of the utility at the topmost zone in the hierarchy. This is the UTIL_LOC_CD field in the Utility table. For more information, see “Load Table” on page 166 .
node2		Specify the ID of the utility at the next zone in the hierarchy.
...		You must specify the ID for every utility in the hierarchy.
node <i>n</i>		Specify the ID of the utility at the last zone in the hierarchy.
path1		Specify the complete path to the forecast instance folder for the topmost zone of the hierarchy. This path is the value of the global macro variable &sef_jif_path that is set by the %SEFCJIF macro when you called the macro to create the forecast instance folder for this zone. For more information, see “Create an Instance Folder for the Forecast” on page 225 . Also see “%SEFCJIF Macro” on page 240 .
path2		Specify the complete path to the forecast instance folder for the next zone in the hierarchy.
...		You must specify the complete path to the forecast instance folder for every zone in the hierarchy.

<code>pathn</code>	Specify the complete path to the forecast instance folder for the next zone in the hierarchy.
--------------------	---

PARM_VSEL

The table `parm_vsel` contains the parameters for a diagnose.

Table 30.3 Columns in `parm_vsel` Table

Name	Label	Default Value	Description
<code>weight_num</code>	Weight	4	Number of weights used to calculate the weighted average temperature. For more information, see “Weight” on page 252 .
<code>weight_lower</code>	Weight Lower	0.8	Lower boundary of weight. For more information, see “Weight Lower” on page 252 .
<code>weight_upper</code>	Weight Upper	0.95	Upper boundary of weight. For more information, see “Weight Upper” on page 253 .
<code>train_start_date</code>	Training Start Date	1-Jan-05	Training data start date. For more information, see “Training Start Date” on page 251 .
<code>rolling_start_date</code>	Rolling Start Date	1-Jan-09	Start date of holdout period. For more information, see “Holdout Start Date” on page 252 .
<code>rolling_end_date</code>	Rolling End Date	30-Mar-09	End date of holdout period. For more information, see “Holdout End Date” on page 252 .
<code>mape</code>	MAPE	<code>hourly_mape</code>	Criterion for selecting the best model. For more information, see “MAPE” on page 253 .
<code>w_hourly_mape</code>	Weight Hourly MAPE	1	The weight assigned to hourly MAPE in calculating weighted mape. For more information, see “Weight Hourly MAPE” on page 253 .
<code>w_daily_mape</code>	Weight Daily MAPE	0	The weight assigned to daily MAPE in calculating weighted mape. For more information, see “Weight Daily MAPE” on page 253 .
<code>w_daily_peak_mape</code>	Weight Daily Peak MAPE	0	The weight assigned to daily peak MAPE in calculating weighted mape. For more information, see “Weight Daily Peak MAPE” on page 253 .

Name	Label	Default Value	Description
w_monthly_mape	Weight Monthly MAPE	0	The weight assigned to monthly MAPE in calculating weighted mape. For more information, see “Weight Monthly MAPE” on page 254.
w_monthly_peak_mape	Weight Monthly Peak MAPE	0	The weight assigned to monthly peak MAPE in calculating weighted mape. For more information, see “Weight Monthly Peak MAPE” on page 254.
w_annual_mape	Weight Annual MAPE	0	The weight assigned to annual MAPE in calculating weighted mape. For more information, see “Weight Annual MAPE” on page 254.
w_annual_peak_mape	Weight Annual Peak MAPE	0	The weight assigned to annual peak MAPE in calculating weighted mape. For more information, see “Weight Annual Peak MAPE” on page 254.
mape_improvement	Mape Improvement	0.0001	MAPE improvement minimum value. For more information, see “MAPE Improvement” on page 254.
outlier_percent	Outlier Percent	0.001	Percentage of observations considered to be outliers. For more information, see “Outlier Percent” on page 254.
residual_hist_length	Residual History Length	504	Residual history length. For more information, see “Residual History Length” on page 255.
combine_fcst	Combine Forecast	1234	Which 2-stage models should be run. For more information, see “Combine Forecast” on page 255.
poly_order	Poly Order	2	Polynomial order. For more information, see “Poly Order” on page 255.
ape_cutoff	APE Cutoff	0.5	Cutoff for observations in the outlier table. For more information, see “APE Cutoff” on page 255.
two_stage	Two Stage	YES	Two-stage processing flag. For more information, see “Two Stage” on page 255.
default_wthr_type_cd	Default Weather Type Code	TEMPF	Default weather type code. For more information, see “Default Weather Type Code” on page 256.
wls	WLS	NO	Weighted least squares model flag. For more information, see “WLS” on page 256.

Name	Label	Default Value	Description
add_var	Additional Modeling Variables		Additional modeling variables. For more information, see “Additional Modeling Variables” on page 256.
add_class	Additional Class Variables		Additional class variables. For more information, see “Additional Class Variables” on page 256.
utility	Utility Code		Not used
num_cpu	Number of CPUs	2	Number of CPUs to run on. For more information, see “Number of CPUs Allocated to SAS Energy Forecasting” on page 257.
staged_data_path	Input Path		Not used
data_model	Data Model	3	Version of the data model. <i>Note:</i> The value should always be 3.
fix_date_holiday_list	Fixed Date Holidays	1 5 8 10	Fixed holiday list. For more information, see “Fixed Date Holidays” on page 257.
sefdg_init_exit	Diagnose Initialization Exit		Diagnose initialization exit location. For more information, see “Diagnose Initialization Exit” on page 257.
sefdg_term_exit	Diagnose Completion Exit		Diagnose completion exit location. For more information, see “Diagnose Completion Exit” on page 257.
input_source	Input Source	SAS	SAS or HANA
hana_input_server	HANA Server		HANA server. For more information, see “HANA Reporting Server” on page 259.
hana_input_instance	HANA Instance		HANA instance. For more information, see “HANA Reporting Instance” on page 259.
hana_input_schema	HANA Schema		HANA schema. For more information, see “HANA Reporting Schema” on page 259.
hana_input_authdomain	HANA Authentication Domain		HANA authorization domain. For more information, see “HANA Reporting Authentication Domain” on page 259.

PARAM_VSTLF

The table `parm_vstlf` contains the parameters for a very short-term load forecast.

Table 30.4 Columns in `parm_vstlf` Table

Name	Label	Default Value	Description
<code>hist_start_date</code>	Historical Start Date	1-Jan-05	Start of historical data. For more information, see “Historical Start Date” on page 258.
<code>fcst_start_date</code>	Forecast Start Date	1-Jan-10	Forecast start date. For more information, see “Forecast Start Date” on page 258.
<code>fcst_start_hour</code>	Forecast Start Hour	1	Forecast start hour. For more information, see “Forecast Start Hour” on page 258.
<code>fcst_length</code>	Forecast Length	24	Forecast length in hours. For more information, see “Forecast Length” on page 258.
<code>optimized_forecast</code>	Optimized Forecast	YES	Optimized forecast. For more information, see “Performance-Optimized Forecast” on page 258.
<code>auto_increment</code>	Enable Event Listening	YES	Enable event listening. For more information, see “Enable Event Listening to Automate Forecasts” on page 258.
<code>increment_minute</code>	Increment Minute	30	Increment minute. For more information, see “Increment Minute” on page 258.
<code>reporting_mart</code>	Reporting Mart	SAS	Type of report mart. For more information, see “Reporting Mart” on page 259.
<code>reporting_sas_data_model</code>	Reporting SAS Data Model	Normalized	Type of reporting data model. For more information, see “Reporting SAS Data Model” on page 259.
<code>hana_output_server</code>	HANA Output Server		HANA server. For more information, see “HANA Reporting Server” on page 259.
<code>hana_output_instance</code>	HANA Output Instance		HANA instance. For more information, see “HANA Reporting Instance” on page 259.
<code>hana_output_schema</code>	HANA Output Schema		HANA schema. For more information, see “HANA Reporting Schema” on page 259.
<code>hana_output_authdomain</code>	HANA Output Authentication Domain		HANA authorization domain. For more information, see “HANA Reporting Authentication Domain” on page 259.

Name	Label	Default Value	Description
sefvs_init_exit	Forecast Initialization Exit		Exit location. For more information, see “Forecast Initialization Exit” on page 259.
sefvs_rpt_exit	Reporting Exit		Exit location. For more information, see “Reporting Exit” on page 260.
sefvs_term_exit	Forecast Completion Exit		Exit location. For more information, see “Forecast Completion Exit” on page 260.
auto_backcast	Auto-Backcast	NO	Auto-Backcast: Yes or No. For more information, see “Auto-Backcast” on page 259.

PARM_STLF

The table `parm_stlf` contains the parameters for a short-term load forecast.

Table 30.5 Columns in `parm_stlf` Table

Name	Label	Default Value	Description
hist_start_date	Historical Start Date	1-Jan-05	Start of historical data. For more information, see “Historical Start Date” on page 260.
fcst_start_date	Forecast Start Date	1-Jan-10	Forecast start date. For more information, see “Forecast Start Date” on page 260.
fcst_end_date	Forecast End Date	7-Jan-10	Forecast end date. For more information, see “Forecast End Date” on page 261.
reporting_mart	Reporting Mart	SAS	Type of report mart. For more information, see “Reporting Mart” on page 261.
reporting_sas_data_model	Reporting SAS Data Model	Normalized	Type of reporting data model. For more information, see “Reporting SAS Data Model” on page 261.
hana_output_server	HANA Server		HANA server. For more information, see “HANA Reporting Server” on page 262.
hana_output_instance	HANA Instance		HANA instance. For more information, see “HANA Reporting Instance” on page 262.
hana_output_schema	HANA Schema		HANA schema. For more information, see “HANA Reporting Schema” on page 262.

Name	Label	Default Value	Description
hana_output_authdomain	HANA Authentication Domain		HANA authorization domain. For more information, see “HANA Reporting Authentication Domain” on page 262.
sefsh_init_exit	Forecast Initialization Exit		Exit location. For more information, see “Forecast Initialization Exit” on page 262.
sefsh_rpt_exit	Reporting Exit		Exit location. For more information, see “Reporting Exit” on page 262.
sefsh_term_exit	Forecast Completion Exit		Exit location. For more information, see “Forecast Completion Exit” on page 262.
auto_backcast	Auto-Backcast	NO	Auto-Backcast: Yes or No. For more information, see “Auto-Backcast” on page 259.

PARM_MTLTLF

The table parm_mtltlf contains the parameters for a medium-term or long-term load forecast.

Table 30.6 Columns in parm_mtltlf Table

Name	Label	Default Value	Description
hist_t_start	Historical T Start	1-Jan-06	Start date for historical temperature. For more information, see “Historical Temperature Start” on page 263.
hist_t_end	Historical T End	31-Dec-10	End date for historical temperature. For more information, see “Historical Temperature End” on page 263.
hist_load_start_dt	Historical Load Start Date	1-Jan-04	Historical start date. For more information, see “Historical Load Start Date” on page 265.
hist_load_end_dt	Historical Load End Date	1-Jan-12	Historical end date. For more information, see “Historical Load End Date” on page 265.
fcst_end_dt	Forecast End Date	31-Dec-13	Forecast end date. For more information, see “Forecast End Date” on page 265.
num_scenarios	Number of Scenerios	2	Number of economic scenarios. For more information, see “Scenarios” on page 265.

Name	Label	Default Value	Description
mtlt_assumption	MLT Assumption	1	How to use GxP in forecast. For more information, see “MLT Assumption” on page 265 .
reporting_mart	Reporting Mart	SAS	Type of report mart. For more information, see “Reporting Mart” on page 266 .
reporting_sas_data_model	Reporting SAS Data Model	Normalized	Type of reporting data model. For more information, see “Reporting SAS Data Model” on page 266 .
hana_output_server	HANA Server		HANA server. For more information, see “HANA Reporting Server” on page 266 .
hana_output_instance	HANA Instance		HANA instance. For more information, see “HANA Reporting Instance” on page 266 .
hana_output_schema	HANA Schema		HANA schema For more information, see “HANA Reporting Schema” on page 266 .
hana_output_authdomain	HANA Authentication Domain		HANA authorization domain. For more information, see “HANA Reporting Authentication Domain” on page 266 .
sefml_init_exit	Forecast Initialization Exit		Exit location. For more information, see “Forecast Initialization Exit” on page 267 .
sefml_rpt_exit	Reporting Exit		Exit location. For more information, see “Reporting Exit” on page 267 .
sefml_term_exit	Forecast Completion Exit		Exit location. For more information, see “Forecast Completion Exit” on page 267 .

Part 7

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Appendix 1

User Preferences

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Overview of SAS Energy Forecasting User Preferences

You can set these categories of user preferences:

- **Global Preferences** apply to your use of any SAS Web application. These preferences are not addressed in this document.
- **SAS Energy Forecasting** preferences apply to your use of SAS Energy Forecasting.

Show System Parameters

This option specifies whether the **System** tab appears in windows where you specify forecast and diagnose parameters. Clear this option to hide the tab.

Filter Archived Instances

This option specifies whether archived diagnose and forecast results appear in the list of more recent diagnose and forecast results

When you archive diagnose and forecast results, they are moved to an archive location and deleted from their original location. However, they can continue to appear in the list of more recent diagnose and forecast results.

Note: You cannot open archived results with the SAS Energy Forecasting user interface. You must open them from their archived location.

Select **Filter Archived Instances** so as not to show archived results along with more recent results.

Clear **Filter Archived Instances** so as to show archived results along with more recent results.

For information about archiving, see [“Archive Results Data” on page 230](#).

Filter Results After # Weeks

This option specifies the age at which diagnose and forecast results are no longer listed with more recent diagnose and forecast results. For example, if you specify five weeks, then diagnose and forecast results older than five weeks old are not listed.

Specify SAS Energy Forecasting User Preferences

1. Select **File** ⇒ **Preferences**.
2. On the left, select **SAS Energy Forecasting**.
3. Specify the user preferences.
4. Click **OK**.

Appendix 2

Run an Event-Triggered Forecast

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Overview

Without opening the SAS Energy Forecasting client, you can use the %SEFDATAE macro on the data tier to run a forecast. The arguments of the %SEFDATAE macro specify which forecasts to run.

Typically, you might run the macro after updating input data for a forecast.

You enable an event-triggered forecast by selecting **Enable event listening to automate forecasts** when specifying the parameters for a forecast.

Very Short-Term Forecast

When you enable event listening for a very short-term forecast, you must specify these parameters:

- **Increment Minute**

The forecast start hour for forecasts run with the %SEFDATAE macro. The number of minutes that you specify determines whether the forecast start hour is the hour that you run the %SEFDATAE macro or the hour just after you run the macro.

For example, assume that you specify 30 for **Increment Minute**.

- If you run the %SEFDATAE macro between 11:00 and 11:29, then the forecast start hour is taken to be 11:00 for forecasts started by the macro.
- If you run the %SEFDATAE macro between 11:30 and 11:59, then the forecast start hour is taken to be 12:00 for forecasts started by the macro.

For any value of **Increment Minute** and anytime that you run the %SEFDATAE macro:

- If the time that you run the %SEFDATAE macro is before that-hour-plus-**Increment Minute**, then the forecast start time is taken to be the hour that you run the macro.
- If the time that you run the %SEFDATAE macro is the same as or after that-hour-plus-**Increment Minute**, then the forecast start time is taken to be the hour after you run the macro.
- **Auto-Backcast**

Auto-backcasting backcasts the energy load for the hour previous to the start hour of the forecast started by the %SEFDATAE macro. For more information, see “[Auto-Backcast](#)” on page 88.

Short-Term Forecast

When you enable event listening for a short-term forecast, you must specify these parameters:

- **Increment Hour**

The forecast start date for forecasts run with the %SEFDATAE macro.

The number of hours that you specify determines whether the forecast start date is the day that you run the %SEFDATAE macro or the day just after you run the macro. For more information, see “[Increment Hour](#)” on page 261.

For example, assume that you specify 12 for **Increment Hour**.

- If you run the %SEFDATAE macro between 00:00 and 11:59, then the forecast start date is taken to be the day that you run the macro.
- If you run the %SEFDATAE macro at or after 12:00, then the forecast start date is taken to be the day after you run the macro.

For any value of **Increment Hour** and any day that you run the %SEFDATAE macro:

- If the time that you run the %SEFDATAE macro is before that-day-plus-**Increment Hour**, then the forecast start date is taken to be the day that you run the macro.
- If the time that you run the %SEFDATAE macro is the same as or after that-day-plus-**Increment Hour**, then the forecast start date is taken to be the day after you run the macro.
- **Auto-Backcast**

For more information, see “[Auto-Backcast](#)” on page 88.

Medium-Term/Long-Term Forecast

When you enable event listening for a medium-term/long-term forecast, there are no additional parameters that need to be specified.

%SEFDATAE Macro

Overview

Run the %SEFDATAE macro on the data tier to run any forecast for which the property **Enable event listening to automate forecasts** has been selected.

Syntax

```
%SEFDATAE(UTILITY=utility-code, STAGE_PATH=input-path,
<FORECAST_TYPE=VSTLF | STLF | MTLTLF>, <NAME_REGEXP=regular-expression>)
```

Required Arguments

utility-code

A forecast is run only if its definition contains this utility code. The macro can run multiple forecasts in multiple projects if the forecast definitions share the same utility code.

input-path

The complete path for the input files. For more information, see [“Input Path for SAS Input Data Source”](#) on page 11.

Optional Arguments

VSTLF

Very short-term load forecasting

STLF

Short-term load forecasting

MTLTLF

Medium-term/long-term load forecasting

regular-expression

A Java regular expression to match a forecast name. A forecast is run only if its name matches this regular expression.

Here are examples of regular expressions:

- **HOURLY\$** matches names that end in HOURLY, such as CT_VSTL_HOURLY
- **^HOURLY** matches names that begin with HOURLY, such as HOURLY_CT_VSLT.

- **HOURLY** and **_HOURLY_** both match names that include HOURLY, such as CT_HOURLY_VSLT.

Here are the restrictions that apply:

- These characters are not allowed: <> () , \N \V \R
- You cannot use any character or sequence of characters that is not valid as an XML attribute.
- You cannot use any character or sequence of characters that cannot be included in a SAS macro variable.

Examples

- `%sefdatae(utility=mass, stage_path=C:\ULF\Data\mass\stage);`
Runs all forecast definitions defined for the region *mass* and using the input files at the location **C:\ULF\Data\mass\stage**
- `%sefdatae(utility=ct, stage_path=C:\ULF\Data\ct\stage, forecast_type=VSTLF);`
Runs all very short-term forecast definitions defined for the region *ct* and using the input files at the location **C:\ULF\Data\ct\stage**
- `%sefdatae(utility=ct, stage_path=C:\ULF\Data\ct\stage, forecast_type=STLF);`
Runs all short-term forecast definitions defined for the region *ct* and using the input files at the location **C:\ULF\Data\ct\stage**
- `%sefdatae(utility=ct, stage_path=C:\ULF\Data\ct\stage, forecast_type=MTLTLF);`
Runs all medium-term/long-term forecast definitions defined for the region *ct* and using the input files at the location **C:\ULF\Data\ct\stage**
- `%sefdatae(utility=ct, stage_path=C:\ULF\Data\ct\stage, name_regexp=HOURLY$, forecast_type=VSTLF);`
Runs all very short-term forecast definitions defined for the region *ct* whose name ends with HOURLY and using the input files at the location **C:\ULF\Data\ct\stage**

Appendix 3

Batch API

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Introduction

The SAS Energy Forecasting solution is typically invoked by navigating to a URL in a web browser and signing in to the SAS Energy Forecasting user interface. From there, you define, customize, and submit diagnose and forecasting jobs and view the results.

You can also create projects and run diagnose, forecast, and reconciliation jobs from the SAS Energy Forecasting batch interface rather than from the user interface. The *batch interface* involves creating SAS programs that run automatically via a script.

The advantage of the batch interface is that you can create and execute large numbers of jobs without having to define each one through the user interface. Job parameters can be automatically updated programmatically to permit the specification of different parameters on a per-job basis.

All definitions and instances created in the batch interface appear in the user interface.

Note: Edit or delete definitions and instances in the user interface. Performing these actions in the user interface ensures that data on the mid-tier is properly updated.

To use the batch interface, you must have, at a minimum, intermediate-level knowledge of the SAS system, basic SAS procedures, and the SAS macro facility.

Note: All the examples in this document are for Microsoft Windows. However, the SAS Energy Forecasting batch interface runs similarly on Linux operating systems.

Run a Forecast

Overview

The SAS Energy Forecasting batch interface is designed as a SAS macro interface. Individual macros are supplied for different functions. The macros can be submitted interactively in SAS Studio, SAS Display Manager, or SAS Enterprise Guide, or can be part of a larger batch SAS program that is submitted to SAS by other means. Consult the appropriate SAS Companion Guide for additional details on executing SAS programs on your operating system.

SAS Energy Forecasting requires that certain data structures be created before using the batch interface to run diagnose or forecasting jobs. The purpose of these data structures is to organize the input data, the output data, and information about the jobs themselves. After the data structures are properly initialized, diagnose and forecasting jobs can be continuously run using the data structures. The creation of the data structures in the batch interface mirrors the tasks in the user interface that accomplish everything from creating projects to running forecasts.

Prepare the Data Structures and Create the Initial Instances

1. [“Create the SAS Energy Forecasting Project Data Path” on page 218](#)

After the project data path is created, running a single diagnose job through the batch interface is a five-step process:

2. [“Customize the Diagnose Parameter Template ” on page 219](#)
3. [“Create the Definition Folder for the Diagnose” on page 218](#)
4. [“Create an Instance Folder for the Diagnose” on page 221](#)
5. [“Run a Diagnose” on page 222](#)

6. [“Check the Diagnose Results” on page 223](#)

After the diagnose job has been run, forecast jobs can be associated with that diagnose job and subsequently run with these five steps:

7. [“Create the Definition Folder for the Forecast” on page 223](#)
8. [“Customize the Forecast Parameter Template” on page 225](#)
9. [“Create an Instance Folder for the Forecast” on page 225](#)
10. [“Run a Forecast” on page 227](#)
11. [“Check the Forecast Results” on page 227](#)

You can run a multi-zone diagnose and forecast. For more information, see [“Run a Multi-Zone Diagnose and Forecast” on page 229](#).

Subsequent Tasks

- Create other forecast instances by repeating [Step 9](#) and [Step 10](#).
- Create new diagnose instances by repeating [Step 4](#) and [Step 5](#).
- Create a different diagnose job definition by repeating [Step 3](#) through [Step 6](#), pointing to a different location in the project data path.
- Associate new forecasting jobs with a different diagnose job definition by repeating [Step 7](#) through [Step 11](#). Alternatively, you can create a new project data path to hold the new diagnose and jobs.
- Create new multi-zone diagnose instances and reconciliation instances. For more information, see [“Run a Multi-Zone Diagnose and Forecast” on page 229](#).

These different tasks can be submitted to SAS individually or as one or more larger programs. For more detail on these programming techniques, see [“Tips and Best Practices” on page 235](#).

Create the SAS Energy Forecasting Project Data Path

The first step is to create and initialize a SAS Energy Forecasting project data path. The *project data path* is a folder structure on disk used to organize the diagnose and forecasting jobs along with their associated input data and output data.

To create the project data path, you must execute the %SEFCDM macro:

```
%sefcdm(datamart_path=C:\SEF_datamarts\EF_datamart_zone1,
        project_nm=EF_datamart_zone1,
        project_desc= Forecasting Project for Zone 1,
        stage_path=C:\SEF_Data,
        all_data_at_stage_root=FALSE,
        batch_run=YES
        );
```

Note: You must have Write access to any specified folders and their contents and authority to create new subfolders. You must be a member of the SAS Energy Forecasting Database users group.

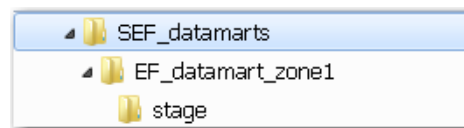
The DATAMART_PATH argument is required and must point to the location on disk where you want the project data path root folder to reside. The location pointed to by DATAMART_PATH does not have to previously exist.

If the macro is successful, the SAS log contains a note similar to this:

```
NOTE: Data mart created successfully at C:\SEF_datamarts\EF_datamart_zone1, rc = 0
```

The macro creates a structure on disk similar to this:

Figure A3.1 Structure Created By %SEFCDM Macro



The macro also sets the global return code macro variable value &sef_rc to 0 (zero). An error in execution results in a nonzero value for &sef_rc.

The %SEFCDM macro also sets the global macro variable &sef_datamart_path to the value of the project data path that was allocated. This can be useful for use in subsequent SAS Energy Forecasting macro invocations.

At this point, the newly created project data path contains only the stage folder.

Create the Definition Folder for the Diagnose

The next step is to create a job definition folder for the diagnose job. A *job definition folder* contains information that is specific to that particular diagnose job definition, for example, parameter settings.

The %SEFCJDF macro creates the job definition folder:

```
libname parm 'C:\SAS\Config\Levl\SASApp\Data\EnergyForecasting\Templates\Batch_Templates';
```

```
%sefcjdf(datamart_path=C:\SEF_datamarts\EF_datamart_zone1,
        job_name=Diagnose_Zone1,
        job_type=vsel,
```

```

job_enabled=FALSE,
diagnose_job_name=,
parm_dataset=parm.parm_vsel,
project_name=EF_datamart_zone1,
batch_run=YES
);

```

The DATAMART_PATH argument points to the project data path that was created in [Step 1 on page 217](#).

The PARM_DATASET argument specifies the appropriate parameter template to use. Note that in the example above, the LIBNAME template was allocated prior to the %SEFCJDF macro so that the parameter template could be found.

For more information about the arguments, see “[%SEFCJDF Macro](#)” on page 238.

Parameter templates are used to control the processing of a job. They are described further in “[Customize the Diagnose Parameter Template](#)” on page 219.

If the macro is successful when executed, the SAS log contains a note similar to the following:

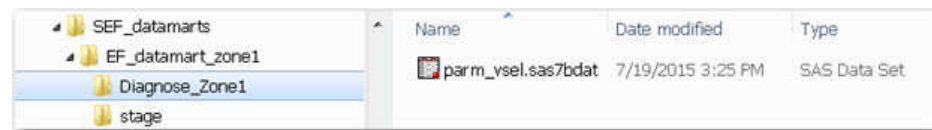
```

NOTE: Job Definition Folder created successfully at
      C:\SEF_datamarts\EF_datamart_zone1\Diagnose_Zone1, rc = 0

```

This macro creates a structure on disk similar to this:

Figure A3.2 Structure Created By %SEFCJDF Macro



Note that the job definition folder created under the project data path folder now contains the specified parameter template.

The macro also sets the global return code macro variable value &sec_rc to 0 (zero). An error in execution results in a nonzero value for &sec_rc.

The %SEFCJDF macro also sets the global macro variable &sef_jdf_path to the value of the job definition folder path that was allocated. This can be useful for use in subsequent SAS Energy Forecasting macro invocations.

Customize the Diagnose Parameter Template

In this step, the parameter template is copied from the Templates subfolder in the SAS configuration directory to the location you specify. You then edit the parameter template in the new location for use in the diagnose or forecast. For example:

```

/*Copy and edit Templates*/
libname Origtemp 'C:\SAS\Config\Levl\SASApp\Data\EnergyForecasting\Templates';

options dlcreatedir;
libname parm 'C:\SAS\Config\Levl\SASApp\Data\EnergyForecasting\Templates\Batch_Templates';

proc sql;
create table template.parm_vsel as select * from origtemp.parm_vsel;

quit;

```

Parameter templates are SAS data sets that are installed when SAS Energy Forecasting is installed. There are different parameter templates that correspond to the supported job types:

Table A3.1 Parameter Templates

Parameter Template	Supported Job Type
parm_rec	reconciliation
parm_vsel	diagnose
parm_vstlf	very short-term load forecast
parm_stlf	short-term load forecast
parm_mtltf	medium-term/long-term load forecast

These parameter templates are Read-Only files that are used to create copies in the job definition folders. They are also used to render the various tabs and menus in the SAS Energy Forecasting user interface. For a description of what each parameter is and how it is used, see [Chapter 30, “Parameter Templates,” on page 197](#).

CAUTION:

Do not modify the parameter templates in the Configuration directory without assistance from SAS Technical Support. Rather, you should edit and customize the parameter template that was copied into the location that you specified. If you incorrectly edit the templates in the SAS configuration directory, this could prevent SAS Energy Forecasting from operating correctly.

The purpose of these parameter templates is to supply job parameters, such as name/value pairs, as SAS macro variables to the diagnose and forecasting jobs. The macro variables control the processing of the input and output data as well as the diagnose and forecasting algorithms.

There are several columns in the parameter template, but only two columns are relevant for the batch interface: name and value. The name column names the macro variable that is passed to the job, and the value column is the value of that macro variable. For a description of what each parameter is and how it is used, see [Chapter 30, “Parameter Templates,” on page 197](#).

To edit the parm_vsel SAS data set for the diagnose job, establish a LIBNAME to the folder that you specified using the supplied library dialog boxes in SAS Display Manager, SAS Studio, or SAS Enterprise Guide. Alternatively, you can use a LIBNAME statement to connect to the library, for example:

```
libname parm 'C:\SAS\Config\Levl\SASApp\Data\EnergyForecasting\Templates\Batch_Templates';
```

Once a connection is established to the parameter template, you can use the editing facilities of one of the above-mentioned tools, for example, VIEWTABLE within SAS Display Manager, to edit the template.

Note:

- Be careful that you edit only the value column. Make no other changes to the template. In particular, make no changes to the name column.

- Do not forget to enter a value for the utility name. The vsel template contains default values for those columns that have a default. But, not every column has a default value, and the utility name is one of those that does not have a default.

Alternatively, you could edit the values in the parameter template from an automated SAS program. This can be particularly useful for changing the date values that control what data is processed by the forecasting job. For more information, see [“Tips and Best Practices” on page 235](#).

Create an Instance Folder for the Diagnose

The next step is to create a job instance folder for the diagnose job. A *job instance folder* contains information that is specific to that particular instance of a diagnose job definition. A *job instance* is a job that is cloned from a job definition and is in one of these states:

1. is waiting to be executed
2. is currently executing
3. has already executed

The %SEFCJIF macro creates the job instance folder:

```

/* Get the current date and time */
data _null_;
length myDate myTime $8;
myDate=put(date(), yymmddn8.);
myTime=put(time(), tod8.);
myTime=compress(myTime, ':');
call symputx('currDate', myDate);
call symputx('currTime', myTime);
run;

/* Create the job instance folder */
%sefcjif (datamart_path= C:\SEF_datamarts\EF_datamart_zone1,
        job_name=Diagnose_Zone1,
        job_type=vsel,
        instance_date=&currDate,
        instance_time=&currTime
        )

/* Copy the parameter template to the job instance location */
libname jdf "&sef_jdf_path";
libname jif "&sef_jif_path";
proc datasets lib=jdf nolist;
    copy in=jdf out=jif;
    select parm_vsel;
run;
quit;
libname jdf;
libname jif;

```

Here is an explanation of the three steps:

1. The first step retrieves the current date and time and puts them into macro variables.
2. The second step executes the %SEFCJIF macro to create the job instance folder.

- The third step copies the parameter template that was customized in [Step 2 on page 217](#) from the job definition folder to the job instance folder.

In the %SEFCJIF macro, the DATAMART_PATH argument points to the project data path that was created in [Step 1 on page 217](#).

The JOB_NAME argument specifies the job definition folder that was created with the %SEFCJDF macro (as in “[Create the Definition Folder for the Diagnose](#)” on page 218). This is the job definition that the job instance is cloned from.

The JOB_TYPE argument specifies the type of job and its values are identical to the values specified for the JOB_TYPE argument in the %SEFCJDF macro in [Step 3 on page 217](#).

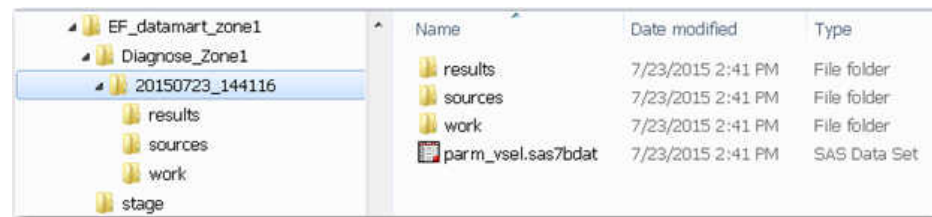
For more information about the parameters, see “[%SEFCJIF Macro](#)” on page 240.

If the macro is successful when executed, the SAS log contains a note similar to the following:

```
NOTE: Job Instance Folder created successfully at
      C:\SEF_datamarts\EF_datamart_zone1\Diagnose_Zone1\20150723_144116,
      rc = 0
```

This macro creates a structure on disk similar to this:

Figure A3.3 Structure Created By %SEFCJIF Macro



Note that the %SEFCJIF macro uses the date and time values to name the job instance folder and that the folder is placed under the job definition folder. Also, a results, sources, and work folder are also created under the job instance folder. Execution of the third step in the example above results in the parameter template being copied to the job instance folder. A parameter template in the job instance folder is required for the diagnose job to run.

The macro also sets the global return code macro variable value &sef_rc to 0 (zero). An error in execution results in a nonzero value for &sef_rc.

The %SEFCJIF macro also sets the global macro variable &sef_jif_path to the value of the job instance folder path that was allocated. This can be useful for use in subsequent SAS Energy Forecasting macro invocations.

Run a Diagnose

After completion of [Step 1](#) through [Step 4 on page 217](#), all data structures and templates are in place and the diagnose job is ready to execute. The %SEFDG macro executes the diagnose job:

```
%sefdg(instance_path=&sef_jif_path,
       stage_path=c:/SEF_Data/input_data/zone1
       batch_run=YES
       );
```

The `INSTANCE_PATH` argument points to the instance path that was created in [Step 4 on page 217](#) using the `%SEFCJIF` macro. Note in the example above, we are using the `&sef_jif_path` macro variable that is automatically created by a previous execution of the `%SEFCJIF` macro. Alternatively, you can specify an explicit path.

For more information about the parameters, see “[%SEFDG Macro](#)” on [page 242](#).

Note: The `diagnose` macro refreshes the data in the source folder from the `stage_path` folder at the beginning of the job.

Check the Diagnose Results

The `diagnose` job might run for several minutes or several hours depending on the amount of data to process and the size of the hardware being used. If the macro is successful when executed, the SAS log contains a note similar to the following:

```
NOTE: Diagnose job ended successfully, rc = 0
NOTE: Diagnose job ended at 23JUL2015:14:48:13.099, elapsed time = 0:23:01.730
```

The `%SEFDG` macro sets the global return code macro variable value `&sef_rc` to 0 (zero). An error in execution results in a nonzero value for `&sef_rc`. You can also view the results in the user interface or check the results folder under the job instance folder to see whether there is any data in the folder from the `diagnose` run.

Create the Definition Folder for the Forecast

After a successful `diagnose` execution, forecast jobs can be run. The forecast jobs have data structure requirements that are similar to the `diagnose` jobs in that both job definition folder(s) and job instance folder(s) must be created before the forecast jobs can be run.

As with the `diagnose` job, a job definition folder must be created for the forecast job. A *job definition folder* contains information that is specific to that particular forecast job definition, for example, parameter settings.

The `%SEFCJDF` macro again creates the job definition folder. Note that there is an additional step that was not needed when creating the job definition folder for the `diagnose` job. Also note that there is an additional argument on the `%SEFCJDF` macro with the forecast job that was not specified with the `diagnose` job:

```
libname parm 'C:\SEF_datamarts\EF_datamart_zone1\Diagnose_Zone1';
libname template 'C:\SAS\Config\Lev1\SASApp\Data\EnergyForecasting\Templates';
/* Combine the parameter templates */
proc datasets lib=work nolist;
copy in=template out=work;
select parm_stlf;
append base=work.parm_stlf data=parm.parm_vsel force;
run;
quit;
libname template clear;

/* Create the job definition folder */
%sefcjdf(datamart_path= C:\SEF_datamarts\EF_datamart_zone1,
        job_name=STLF_Forecast_Zone1,
        job_type=stlf,
        job_enabled=FALSE,
        diagnose_job_name=Diagnose_Zone1,
        parm_dataset=work.parm_stlf,
```

```

project_name=EF_datamart_zone1
batch_run=YES
);

```

The purpose of the additional PROC DATASETS step prior to the %SEFCJDF macro step is to combine the diagnose parameter template parm_vsel with the forecast parameter template—the parm_stlf template in this example. Note that the parm_vsel template is the copy that was modified in [Step 2 on page 217](#) rather than the original parm_vsel template that is in `C:\SAS\Config\Levl\SASApp\Data\EnergyForecasting\Templates`.

The template diagnose parameter template parm_vsel contains some common parameter settings that are used by all jobs, both diagnose and forecasting jobs. However, the template forecast parameter templates contain only those parameters that are specific to the forecast that is being executed, such as vstlf, stlf, or mtltf. Because the forecast jobs require the common parameters in parm_vsel as well as the forecast-specific parameters, the parameter templates must be combined into a single file. That combined file is then specified in the PARM_DATASET argument in the %SEFCJDF macro so that it is copied into the job definition folder for the forecast job.

For example, if you were running a medium-term/long-term forecast job, the code would look like this:

```

libname template 'C:\SAS\Config\Levl\SASApp\Data\EnergyForecasting\Templates';

/* Combine the parameter templates */
proc datasets lib=work nolist;
copy in=template out=work;
select parm_mtltf;
append base=work.parm_mtltf data=template.parm_vsel force;
run;
quit;
libname template clear;

/* Create the job definition folder */
%sefcjdf(datamart_path= C:\SEF_datamarts\EF_datamart_zone1,
        job_name=MTLTF_Forecast_Zone1,
        job_type=mtltf,
        job_enabled=FALSE,
        diagnose_job_name=Diagnose_Zone1,
        parm_dataset=work.parm_mtltf
        project_name=EF_datamart_zone1
        batch_run=YES
);

```

Note: For clarity, the changed parameters are shown shaded to make them stand out.

The arguments in the %SEFCJDF macro in this example are similar to the arguments specified in the step 3 example (“[Create the Definition Folder for the Diagnose](#)” on page 218) for the diagnose job, except that the DIAGNOSE_JOB_NAME argument is required. This argument must be specified only when creating a job definition folder for a forecast job, not for a diagnose job. If specified on a diagnose job, it is ignored. The DIAGNOSE_JOB_NAME argument specifies the “owning” diagnose job for the forecast job, such as what diagnose job this forecast job definition is associated with.

If the macro is successful when executed, the SAS log contains a note similar to the following:

```

NOTE: Job Definition Folder created successfully at
C:\SEF_datamarts\EF_datamart_zone1\Diagnose_Zone1\STLF_Forecast_Zone1, rc = 0

```

This macro creates a structure on disk similar to this:

Figure A3.4 Structure Created By %SEFCJDF Macro



Note that the job definition folder for the forecast job is placed under the job definition folder for the diagnose. Also note that, as in [Step 3 on page 217](#) with the diagnose job, the job definition folder for the forecast job contains the specified parameter template, in this case, parm_stlf.

The macro also sets the global return code macro variable value &sef_rc to 0 (zero). An error in execution results in a nonzero value for &sef_rc. The %SEFCJDF macro also sets the global macro variable &sef_jdf_path to the value of the job definition folder path that was allocated.

Customize the Forecast Parameter Template

Customizing the Forecast Parameter template is similar to customizing the Diagnose Parameter template in [Step 2 on page 217](#), except that the name/value pairs in the Forecasting template are slightly different and the parameter template being modified is located in the Forecast Definition folder. Depending on what time horizon you are executing, one of these forecast templates is combined with the parm_vstlf template and added to the forecast definition folder:

- parm_vstlf: very short-term load forecast
- parm_stlf: short-term load forecast
- parm_mtltf: medium-term/long-term load forecast

For a description of what each parameter is and how it is used, see [Chapter 30](#), “Parameter Templates,” on page 197.

Create an Instance Folder for the Forecast

The next step is to create a job instance folder for the forecast job. A *job instance folder* contains information that is specific to that particular instance of a forecast job definition. As with the diagnose job, the %SEFCJIF macro creates the job instance folder:

```

/* Get the current date and time */
data _null_;
length myDate myTime $8;
myDate=put(date(), yymmddn8.);
myTime=put(time(), tod8.);
myTime=compress( myTime, ':');
call symputx('currDate', myDate);
call symputx('currTime', myTime);
run;

/* Create the job instance folder */
%sefcjif(datamart_path= C:\SEF_datamarts\EF_datamart_zone1,

```

```

        job_name=STLF_Forecast_Zone1,
        job_type=stlf,
        diagnose_job_name=Diagnose_Zone1,
        instance_date=&currDate,
        instance_time=&currTime
    );

    /* Copy the parameter template to the job instance location */
    libname jdf "&sef_jdf_path";
    libname jif "&sef_jif_path";
    proc datasets lib=jdf nolist;
    copy in=jdf out=jif;
    select parm_stlf;
    run;
    quit;
    libname jdf;
    libname jif;

```

The arguments for the %SEFCJIF macro in this example are similar to the arguments specified in the [Step 4](#) example for the diagnose job (“[Create an Instance Folder for the Diagnose](#)” on page 221), except that the DIAGNOSE_JOB_NAME argument is added because we are creating a job instance folder for a forecast. This argument must be specified only when creating a job instance folder for a forecast job, not for a diagnose job. If specified on a diagnose job, it is ignored. The DIAGNOSE_JOB_NAME argument specifies the “owning” diagnose job for the forecast job, such as what diagnose job this forecast job instance is associated with.

Note also that the JOB_TYPE argument for the %SEFCJIF macro specifies a value of stlf for short-term load forecast.

If the macro is successful when executed, the SAS log contains a note similar to the following:

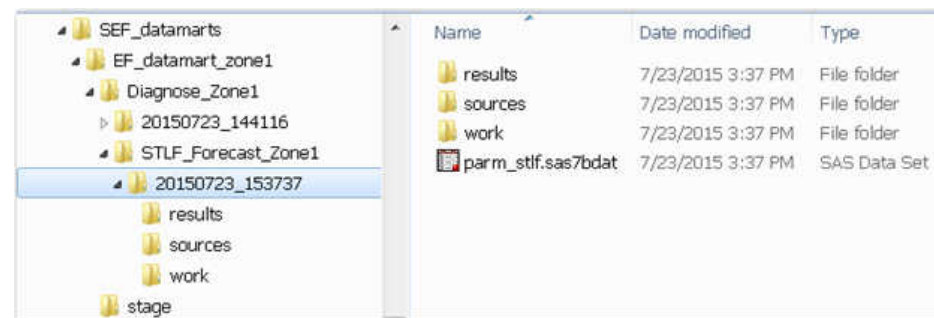
```

NOTE: Job Instance Folder created successfully at
C:\SEF_datamarts\EF_datamart_zone1\Diagnose_Zone1\STLF_Forecast_Zone1\20150723_153737, rc = 0

```

This macro creates a structure on disk similar to this:

Figure A3.5 Structure Created By %SEFCJIF Macro



As with the diagnose job, the job instance folder uses the date and time values to name the folder and place it under the job definition folder. The appropriate parameter template is also copied in the third step of the example.

The macro also sets the global return code macro variable value &sef_rc to 0 (zero). An error in execution results in a nonzero value for &sef_rc.

The %SEFCJIF macro also sets the global macro variable &sef_jif_path to the value of the job instance folder path that was allocated.

Run a Forecast

After completion of [Step 7](#) through [Step 9 on page 217](#), all data structures and files are in place and the forecast job is ready to execute. You should use one of the following macros depending on which time horizon you are executing:

- %SEFVS: very short-term load forecast
- %SEFSH: short-term load forecast
- %SEFML: medium-term/long-term load forecast

The arguments for all three macros are identical, as well as identical to the %SEFDG macro (diagnose), except that the %SEFML macro contains the additional argument `mzd_run=NO/YES`.

Here is an example of the %SEFSH macro:

```
%sefsh(instance_path=&sef_jif_path,
       stage_path=c:\SEF_Data\input_data\zone1,
       diagnose_path=C:\SEF_datamarts\EF_datamart_zone1\Diagnose_Zone1\20150723_144116,
       mzd_run=NO, /*for MTLTLF only*/
       batch_run=YES
       );
```

The INSTANCE_PATH argument points to the instance path that was created in [Step 9 on page 217](#) using the %SEFCJIF macro. This argument is required. Note in the example above we are using the &sef_jif_path macro variable that is automatically created by the previous execution of the %SEFCJIF macro. Alternatively, you can specify an explicit path.

The STAGE_PATH argument points to the location of the input data, such as the load data and weather data. If this argument is not specified, the %SEFDG macro assumes that the input data is in the stage folder of the project data path.

The DIAGNOSE_PATH argument points to the diagnose instance that was the basis for the forecast definition.

The MZD_RUN=NO is set only for a medium-term/long-term forecast run.

Note: The forecast macros refresh the data in the source folder from the stage_path folder at the beginning of the job.

Check the Forecast Results

The forecast job might run for several minutes, or several hours, depending on the amount of data to process and the size of the hardware being used. If the macro is successful when executed, the SAS log contains a note similar to this:

```
NOTE: Short term Load Forecasting job ended successfully, rc = 0
NOTE: Short term Load Forecasting job ended at 23JUL2015:15:51:44.568, elapsed time = 0:02:01.671
```

The %SEFVS, %SEFSH, and %SEFML macros set the global return code macro variable value &sef_rc to 0 (zero). An error in execution results in a nonzero value for &sef_rc. You can also view the results in the user interface or check the results folder under the job instance folder to see whether there is any data in the folder from the forecast run.

Run a Reconciliation

Overview

1. “Run Forecasts in the Geographical Hierarchy” (See page 228.)
2. “Create a Folder for a Reconciliation Definition” (See page 228.)
3. “Customize the Reconciliation Parameter Template ” (See page 228.)
4. “Create a Folder for a Reconciliation Instance” (See page 229.)
5. “Run the Reconciliation” (See page 229.)

Run Forecasts in the Geographical Hierarchy

To run a reconciliation of geographical hierarchy, you must have run a successful forecast for every zone in the hierarchy.

Note: Every forecast for a reconciliation must be in the same project, must be of the same type (short term, very short-term, medium-term/long-term), and have the same forecast horizon. The horizon for very short-term and short-term load forecasting is from the forecast start date to the forecast end date. For medium-term and long-term load forecasting, the horizon is from the historical load start date to the forecast end date.

See Also

“Run a Forecast” on page 216

Create a Folder for a Reconciliation Definition

Run the %SEFCJDF macro to create a folder to contain the reconciliation parameter template. The JOB_TYPE argument of the %SEFCJDF macro must be set to **rec**.

See Also

- “%SEFCJDF Macro” on page 238
- “Customize the Reconciliation Parameter Template ” on page 228

Customize the Reconciliation Parameter Template

To run a reconciliation for a geographical hierarchy, you must customize the reconciliation parameter template, `parm_rec`. The table `parm_rec` contains the parameters for a geographical hierarchical reconciliation.

For each node in the hierarchy to reconcile, you must provide a node name for each node in the hierarchy and a path to the forecast definition for each node in the hierarchy.

TIP Create the reconciliation definition in user interface, then reuse the `parm.rec` for the batch runs. This is especially useful when there are many nodes in the hierarchy.

After customizing the template for the reconciliation that you want to run, copy the template to the folder that you created in [Step 3 on page 217](#).

See Also

- [“PARM_REC” on page 198](#)
- [“Customize the Diagnose Parameter Template” on page 219](#)
- [Chapter 30, “Parameter Templates,” on page 197](#)
- [Chapter 17, “Forecasting a Geographical Hierarchy,” on page 93](#)

Create a Folder for a Reconciliation Instance

Run the %SEFCJIF macro, with job_type=rec, to create a folder to contain the results of the reconciliation.

See Also

[“%SEFCJIF Macro” on page 240](#)

Run the Reconciliation

Run the %SEFREC macro to run the reconciliation.

See Also

[“%SEFREC Macro” on page 244](#)

Run a Multi-Zone Diagnose and Forecast

Overview

1. [“Run Diagnose for the Selected Parent Node” \(See page 229.\)](#)
2. [“Customize the Parameter Template for the Multi-Zone Diagnose” \(See page 230.\)](#)
3. [“Create a Folder for the Multi-Zone Forecast Definitions” \(See page 230.\)](#)
4. [“Run the Multi-Zone Forecast” \(See page 230.\)](#)

Note: The instance folders are created when a multi-zone diagnose is run.

Run Diagnose for the Selected Parent Node

Creating and running a multi-zone diagnose is the same process as creating and running a diagnose, except that the job_type argument is set to mzd. The utility in the parm.vsel template must be defined with the parent utility for the multi-zone diagnose.

See Also

[“Run a Forecast” on page 216](#)

Customize the Parameter Template for the Multi-Zone Diagnose

The parameter template for the multi-zone diagnose is configured for the parent utility (top node) and applied to all of the descendant utilities.

See Also

[“Customize the Forecast Parameter Template” on page 225](#)

Create a Folder for the Multi-Zone Forecast Definitions

Run the %SEFCMFD macro to create a folder to contain the parameter template for the multi-zone diagnose forecast type. The JOB_TYPE argument of the %SEFCMZDF macro must be set to the forecast type of the multi-zone diagnose.

A forecast definition for the parent node and for each child is created with the same parameters. You specify a prefix for the forecast definition. This prefix is placed before the node name to create a unique definition name.

See Also

[“%SEFCMZFD Macro” on page 241](#)

Run the Multi-Zone Forecast

Run the %SEFRMZ macro to run the parent node and all of the descendant forecasts. The Job Instance Folder is created when the macro starts to run for the node.

See Also

[“%SEFRMZ Macro” on page 245](#)

Archive Results Data

Overview

SAS Energy Forecasting is very data intensive and generates large amounts of data. To help you manage this data, SAS Energy Forecasting provides two methods to archive the results of forecasts and diagnoses: the routine maintenance archive method and the model preservation archive method. Each method involves calling the %SEFARCHE macro on the data tier to signal SAS Energy Forecasting to archive results data.

Either method removes results data sets and declutters the user interface by removing old or obsolete diagnoses and forecasts. However, only the model preservation method archives the source folders, work folders, and definition files by default.

You can also declutter the user interface by specifying certain user preferences.

See Also

- [Appendix 1, “User Preferences,” on page 209](#)
- [“%SEFARCHE Macro” on page 236](#)

Routine Maintenance Archive Method

Overview

By default, the routine maintenance archive method archives only the results folders for every diagnose definition and forecast definition in every project. Then, it deletes all of the folders. This method is best for routinely clearing disk space and decluttering the user interface.

CAUTION:

By default, the routine maintenance archive method does not archive the source folders, work folders, and definition files. These items are deleted.

Note: You can change which folders and tables are archived by the routine maintenance archive method. For more information, see “[Archive Templates](#)” on page 231.

You initiate the routine maintenance archive method by calling the %SEFARCHE macro without specifying any arguments. The macro archives data based on one of two things, in this order:

1. archive templates
2. application settings in SAS Management Console

Note: Multi-zone run summary instances are not archived because they do not contain any data. They provide a status of all the forecast instances that are run as part of a multi-zone diagnose.

Archive Templates

You can specify the folders and tables to archive through the use of archive templates. An *archive template* is a SAS data set with a specific name. You can define an archive template for diagnoses and for each forecast type.

To use an archive template, the archive template must be in the template directory. Here are the archive template names:

SAS Data Set Name	Files Archived
archive_diagnose.sas7bdat	Diagnose files
archive_vstlf.sas7bdat	Very short-term load forecasting files
archive_stlf.sas7bdat	Short-term load forecasting files
archive_mtltf.sas7bdat	Medium-term/long-term load forecasting files

Here are the columns that the SAS data sets must contain:

Column Name	Column Contents
sub_dir	<p>Each row in this column must contain one of the four following string values:</p> <ul style="list-style-type: none"> • results Specifies files in the results subfolder • sources Specifies files in the sources subfolder • work Specifies files in the work subfolder • SAS null data set value (.) Specifies files in the base folder
filename	<p>Each row in this column contains a string that matches the name of a file to archive. The file specified must be in the folder specified in the corresponding sub_dir column. You must specify the full filename including the file extension (for example, .sas7bdat).</p>

There is a set of sample data sets for you to review and modify. On Windows, they are in the SAS Home folder. For example: `C:\Program Files\SAS Home\SASFoundation\9.4\enfcsvr\sample`. For more information, refer to the *SAS Energy Forecasting Installation Guide* available at <http://support.sas.com/documentation/solutions/ef/>.

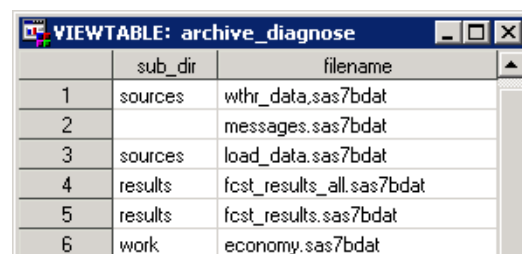
At run time, these data sets must reside in the same folder as the parameter template files. On Windows, for example, this location is `C:\SAS\Config\Levl\AppData\EnergyForecasting\templates`. For more information, see [Chapter 30, “Parameter Templates,”](#) on page 197.

CAUTION:

Do not confuse the archive templates with the parameter templates. Do not edit the parameter templates that reside in the template directory.

This figure shows a sample SAS data set, archive_diagnose.

Figure A3.6 Sample SAS Data Set archive_diagnose



	sub_dir	filename
1	sources	wthr_data.sas7bdat
2		messages.sas7bdat
3	sources	load_data.sas7bdat
4	results	fcst_results_all.sas7bdat
5	results	fcst_results.sas7bdat
6	work	economy.sas7bdat

This sample data set specifies this information:

- In the sources folder, archive the files wthr_data.sas7bdat and load_data.sas7bdat.
- In the base folder (null in the **sub_dir** field), archive the file messages.sas7bdat.

- In the results folder, archive the files fest_results_all.sas7bdat and fest_results.sas7bdat.
- In the work folder, archive the file economy.sas7bdat.

Application Settings in SAS Management Console

If you do not create archive templates, the routine maintenance archive method uses application settings on the **Advanced** tab and the **Settings** tab in SAS Management Console.

To view or modify the application settings:

1. In SAS Management Console on the **Plug-ins** tab, expand **Application Management** ⇒ **Configuration Manager** ⇒ **SAS Application Infrastructure**.
2. Right-click **Energy Forecasting 3.2**, and select **Properties**.

The Energy Forecasting 3.2 Properties window appears.

Here is the application setting on the **Advanced** tab that controls archiving:

- **ENFC.Archive.path**

The file path that is the base path for archiving. The file path that you specify can be local to the data tier or it can be on a remote machine that is accessible by the data tier.

To specify the application setting, perform these steps:

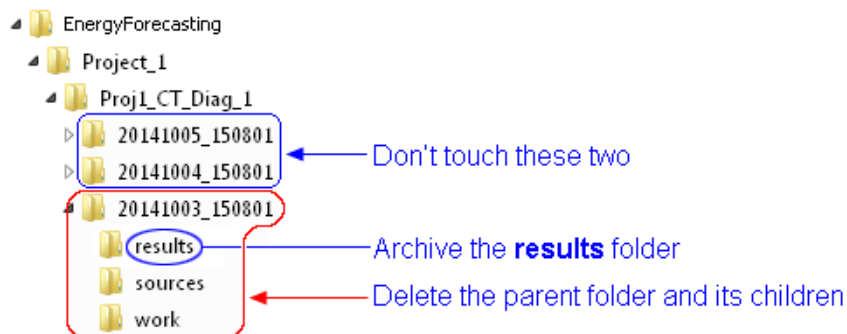
1. If this property does not exist, click **Add** and specify **ENFC.Archive.path** for **Property Name**.
2. Specify a complete path for **Property Value**.
3. Restart the data tier server for the change to take effect.

Here are the application settings on the **Settings** tab that control the archiving:

- **Number of diagnose results to keep**

The number of most recent diagnose results to keep. The remainder are archived and then deleted. For example, if you enter 2, then for each diagnose definition, results that are older than the two most recent results are archived and deleted.

Here is a representation of the example:



Here are the results:

- The two newest diagnose results are untouched.
- The **results** folder of the 20141003_150801 folder is archived.
- The older folder is deleted.

- **Archive MTLT forecast results older than this many weeks**

The number of weeks old a medium-term/long-term forecast must be to archive it. For example, suppose you enter 8. Then, for each medium-term/long-term forecast definition, all of its forecast results that are older than eight weeks are archived—that is, the results folder is archived. And then the parent folder is deleted.

- **Archive ST forecast results older than this many days**

The number of days old a short-term forecast must be to archive it. For example, suppose you enter 6. Then, for each short-term load forecast definition, all of its forecast results that are older than six days are archived—that is, the results folder is archived. And then the parent folder is deleted.

- **Archive VST forecast results older than this many hours**

The number of hours old a very short-term forecast result must be to archive it. For example, suppose you enter 4. Then, for each very short-term load forecast definition, all of its forecast results that are older than four hours are archived—that is, the results folder is archived. And then the parent folder is deleted.

For more information, see [“Manage Application Settings” on page 158](#).

Model Preservation Archive Method

The model preservation archive method archives a specific model, such as the best model. This method archives all of the data in the diagnose or forecast instance folder that you specify when calling the %SEFARCHE macro. The archived data can be used later to re-create the best model for forecasting and regulatory purposes.

Note: The model preservation archive method does not require you to create archive templates. The needed information is automatically archived.

Here is an example:

```
%sefarche(archive_path=c:\my_archive, instance_name=20170103_142533);
```

The Archiving Process

The archiving process creates these subfolders under the *base_path*:

- Diagnose archive subfolders

For each diagnose that is archived, a subfolder is created using the following naming convention:

```
<base_path>\project_name\diagnose_definition_name\diagnose_results_name
```

For example: **C:\SEF_Archive**

```
\Project_1\Proj1_CT_Diag_1\20141002_150801.
```

- Forecast archive subfolders

For each forecast that is archived, a subfolder is created using the following naming convention:

```
<base_path>\project_name\forecast_definition_name\forecast_results_name
```

For example: **C:\SEF_Archive**

```
\Project_1_CT_Diag_1\Proj1_CT_VSTLF_1\20141002_172617.
```

Tips and Best Practices

Overview

Here are some general recommendations and tips that might assist you when working with the SAS Energy Forecasting batch interface.

Check SAS Logs and Return Codes

Every batch interface macro sets global return code macro variable `&sef_rc`. Successful execution yields a value of 0 (zero), an error in execution results in a nonzero value. The SAS log might also contain messages that can assist in debugging errors.

Use the `&&sef_debug` Macro Variable When Necessary

When set to 1, the global macro variable `&sef_debug` results in more debugging information being written to the SAS log. Since this variable might result in large volumes of information and longer execution times, it should be used only for occasional debugging.

Combine Macros Into a Single Job

The macros do not have to be run singly, one at a time. They can be combined into larger jobs that accomplish several things. Here is a simple example combining the `%SEFCJIF` and `%SEFSTLF` macros to run a forecasting job instance:

```
/* Get the current date and time */
  data _null_;
  length myDate myTime $8;
  myDate = put ( date(), yymmddn8. );
  myTime = put ( time(), tod8. );
  myTime = compress( myTime, ':' );
  call symputx( 'currDate', myDate );
  dcall symputx( 'currTime', myTime );
  run;

/* Create the job instance folder */
%sefcjif ( datamart_path=C:\SEF_datamarts\EF_datamart_zone1,
          job_name=STLF_Forecast_Zone1,
          job_type=stlf,
          diagnose_job_name=Diagnose_Zone1,
          instance_date=&currDate,
          instance_time=&currTime
        )

/* Copy the parameter template to the job instance location */
libname jdf "C:\SEF_datamarts\EF_datamart_zone1\Diagnose_Zone1\STLF_Forecast_Zone1";
libname jif "&sef_jif_path";
proc datasets lib=jdf nolist;
  copy in=jdf out=jif;
  select parm_stlf;
```

```

run;
quit;
libname jdf;
libname jif;

/* Run the short-term load forecast */
%sefsh ( instance_path=&sef_jif_path,
        stage_path=c:/SEF_Data/input_data/zone1
        )

```

Once the initial project data path and job definition folders have been set up, this code can be run repetitively to create and run multiple job instances.

Update the Parameter Data Set Dynamically

Rather than manually customizing the parameter data set via some interactive editor (as in [Step 2 on page 217](#) and [Step 8 on page 217](#)), you can update the parameter data set via a SAS program. This enables you to change the parameter values dynamically for each run, based on changing date/times or other criteria. For example,

```

libname jdf 'C:\SEF_datamarts\EF_datamart_zone1\Diagnose_Zone1';
data jdf.parm_vsel;
  set jdf.parm_vsel;
  if name = 'rolling_start_date' then value = '01JUL2012';
  if name = 'poly_order' then value = '3';
  output;
run;

```

In this example, two parameters in the `parm_vsel` parameter template in the job definition folder have been modified by this program. Note that the SAS variable `value` is a character variable, so all assignment statements must equate that variable to a character value.

List of Macros

Location of Macros

By default, you can find the following macros installed at `C:\Program Files\SASHome\SASFoundation\9.4\enfcsvr\sasmacro`.

%SEFARCHE Macro

Overview

Archives results data.

Run the %SEFARCHE macro on the data tier to signal SAS Energy Forecasting to archive results data. Only one instance of the macro can run at a time.

Note:

- Ensure that the user Energy Forecasting Server User has Write permission to the folders that are created by the archiving process. The user Energy Forecasting Server User is created upon installation of SAS Energy Forecasting. On a

Windows system, you grant permission by right-clicking a folder and selecting **Properties**. Then click the **Security** tab.

- Ensure that the user Energy Forecasting Server User has the following capabilities:
- Delete Diagnose Results
- Delete Forecast Results
- Energy Forecasting User

For more information, see “Roles” on page 176.

Syntax

```
%SEFARCH(<ARCHIVE_PATH=base-path>
<, INSTANCE_NAME=instance-name>);
```

Optional Arguments

base-path

A complete file path, such as **C:\sef_archive**.

The file path that you specify can be local to the data tier or it can be on a remote machine that is accessible by the data tier. The file path is the base path for archiving.

Note: You can specify an archive path by specifying the property ENFC.Archive.path in SAS Management Console. For more information, see “Application Settings in SAS Management Console” on page 233. If specify both ENFC.Archive.path and *base-path*, *base-path* is used.

instance-name

An instance name, such as 20170103_142533.

Example

```
%sefarche(archive_path=c:\my_archive, instance_name=20170103_142533);
```

%SEFCDM Macro

Overview

Creates a folder that contains the following subfolders for objects belonging to a project:

- Diagnose definitions
- Reconciliation definitions
- Report data

Syntax

```
%SEFCDM(DATAMART_PATH=datamart-path,
PROJECT_NM=project-name,
BATCH_RUN=YES
<, PROJECT_DESC=project-description>
<, STAGE_PATH=path-to-source-data>
<, ALL_DATA_AT_STAGE_ROOT=TRUE | FALSE>);
```

Required Arguments*datamart-path*

The project data path. For more information, see “Project Data Path” on page 12.

project-name

The name of the project. The value must contain only letters, numbers, and the underscore character.

BATCH_RUN=YES

Indicates that a record needs to be processed so that it appears in the user interface.

Optional Arguments*project-description*

The description of the project.

path-to-source-data

The location of the source data to use for forecasting.

TRUE | FALSE

Indicates whether the source data is a single file.

The source data location can contain files by hierarchy node or a single file that contains the source data for all nodes.

Example

```
%sefcdm(datamart_path=C:\SEF_datamarts\EF_datamart_zone1);
```

See Also

- “Create the SAS Energy Forecasting Project Data Path” on page 218
- “Project Data Path” on page 12
- Chapter 22, “Project Folders,” on page 151

%SEFCJDF Macro**Overview**

Creates a folder to contain the parameter template and input data sets for running a diagnose, forecast, or reconciliation.

Syntax

```
%SEFCJDF (DATAMART_PATH=datamart-path,  
JOB_NAME=job-name,  
JOB_TYPE=VSEL | VSTLF | STLF | MTLTLF | REC | MZD,  
JOB_ENABLED=YES | NO,  
DIAGNOSE_JOB_NAME=diagnose-job-name,  
PARAM_DATASET=parm-dataset,  
PROJECT_NAME=project-name,  
BATCH_RUN=YES  
<, JOB_DESCRIPTION=description>);
```

Required Arguments*datamart-path*

The project data path. For more information, see “Project Data Path” on page 12.

job-name

The name of the job definition folder. The value must contain only letters, numbers, and the underscore character.

VSEL | VSTLF | STLF | MTLTLF | REC | MZD

The type of job. Here are the valid values:

- VSEL: Diagnose job
- VSTLF: Very short-term load forecast job
- STLF: Short-term load forecast job
- MTLTLF: Medium-term/long-term load forecast job
- REC: Reconciliation job
- MZD: Multi-zone diagnose job

YES | NO

Indicates whether event listening is enabled.

diagnose-job-name

The name of the diagnose job definition that is associated with this forecast job definition.

The name must be an exact match, including case. The folder named by this parameter must exist before calling this macro.

This argument is required only for forecast job definitions, such as when JOB_TYPE is not VSEL. If JOB_TYPE is VSEL, then this argument is ignored.

parm-dataset

The parameter template to copy into the job definition folder.

Format is *libname.datasetname*. Valid values for *datasetname* are:

- parm_vsel: diagnose parameters
- parm_vstlf: very short-term load forecast parameters
- parm_stlf: short-term load forecast parameters
- parm_mtltf: medium-term/long-term load forecast parameters
- parm_rec: reconciliation parameters

For more information, see [Chapter 30, “Parameter Templates,” on page 197](#).

project-name

The name of the project. This argument is required to create a forecast definition folder but is not required to create a diagnose definition folder.

BATCH_RUN=YES

Indicates that a record needs to be processed so that it appears in the user interface.

Optional Argument*description*

The description of the job definition folder.

Example

```
libname template 'C:\SAS\Config\Lev1\SASApp\Data\EnergyForecasting\Templates';

%sefcjdf(datamart_path=C:\SEF_datamarts\EF_datamart_zone1,
        job_name=Diagnose_Zone1,
```

```

job_type=vsel,
job_enabled=FALSE,
parm_dataset=template.parm_vsel,
batch_run=YES
);

```

```
libname template clear;
```

See Also

- “Create the Definition Folder for the Diagnose” on page 218
- “Diagnose Definition Folder” on page 152
- “Forecast Definition Folder” on page 153
- “Reconciliation Definition Folder” on page 154

%SEFCJIF Macro

Overview

Creates a folder to contain the results of running a diagnose, forecast, or reconciliation.

Syntax

```

%SEFCJIF (DATAMART_PATH=datamart-path,
JOB_NAME=job-name,
JOB_TYPE=VSEL | VSTLF | STLF | MTLTLF | REC | MZD,
DIAGNOSE_JOB_NAME=job-name,
INSTANCE_DATE=instance-date,
INSTANCE_TIME=instance-time);

```

Required Arguments

datamart-path

The project data path. For more information, see “[Project Data Path](#)” on page 12.

job-name

The name of the job definition folder. The value must contain only letters, numbers, and the underscore character.

VSEL | VSTLF | STLF | MTLTLF | REC | MZD

The type of job. Here are the valid values:

- VSEL: Diagnose job or diagnose job definition folder
- VSTLF: Very short-term load forecast job
- STLF: Short-term load forecast job
- MTLTLF: Medium-term/long-term load forecast job
- REC: Reconciliation job
- MZD: Multi-zone diagnose job

diagnose-job-name

The name of the diagnose job definition that is associated with this forecast job definition.

The name must be an exact match, including case. The folder named by this parameter must exist before calling this macro.

This argument is required only for forecast job definitions, such as when JOB_TYPE is not VSEL. If JOB_TYPE is VSEL, then this argument is ignored.

instance-date

Specifies the current date in YYYYMMDD format. The values of *instance-date* and *instance-time* are used to create uniquely named folders for each job instance.

instance-time

Specifies the current time in HHMMSS format. The value of *instance-time* is appended to the value of *instance-date* (separated by an underscore character) to create a uniquely named folder for each job instance.

Example

```
%sefcjif(datamart_path= C:\SEF_datamarts\EF_datamart_zone1,
        job_name=Diagnose_Zone1,
        job_type=vsel,
        instance_date=&currDate,
        instance_time=&currTime
        );
```

See Also

- [“Create an Instance Folder for the Forecast” on page 225](#)
- [“Diagnose Instance Folder” on page 153](#)
- [“Forecast Instance Folder” on page 153](#)

%SEFCMZFD Macro

Overview

Creates a folder to contain the parameter template and input data sets for running a multi-zone forecast for the parent node and all descendant nodes.

Syntax

```
% SEFCMZFD (DATAMART_PATH=datamart-path,
JOB_PREFIX=job-name-prefix,
JOB_TYPE=VSEL | VSTLF | STLF | MTLTLF,
JOB_ENABLED=TRUE | FALSE,
DIAGNOSE_JOB_NAME=diagnose-job-name,
PARAM_DATASET=parameter-dataset,
PROJECT_NAME=project-name
<, JOB DESCRIPTION=job-description>);
```

Required Arguments

datamart-path

The root path for the data mart for the project.

job-name-prefix

Prefix to use for naming the forecast jobs.

VSEL | VSTLF | STLF | MTLTLF

The type of forecast for the job definition. Here are the valid values:

- VSEL: Diagnose job or diagnose job definition folder
- VSTLF: Very short-term load forecast job
- STLF: Short-term load forecast job
- MTLTLF: Medium-term/long-term load forecast

TRUE | FALSE

Indicates whether event listening is enabled.

diagnose_job_name

The name of the diagnose job definition for the parent zone whose decedents are being created.

parameter-dataset

The parameter template to copy into the job definition folder. The format is LIBNAME.*datasetname*.

Here are the valid values for *datasetname*:

- parm_vsel: Diagnose parameters
- parm_vstlf: Very short-term load forecast parameters
- parm_stlf: Short-term load forecast parameters
- parm_mtltf: Medium-term/long-term load forecast parameters

project_name

The project that contains the multi-zone diagnose.

Optional Argument

job-description

The description of the job.

Example

```
%sefcmzfd(datamart_path= C:\SEF_datamarts\EF_datamart_zone1,
          job_prefix=Z1MZD,
          job_description=,
          job_type=stlf,
          job_enabled=False,
          diagnose_job_name=Diag_Z1MZD,
          parm_dataset=Runtemp.parm_stlf,
          project_name= EF_datamart_zone1
        );
```

%SEFDG Macro

Overview

Runs the diagnose defined by the %SEFCJDF macro.

Syntax

```
%SEFDG(INSTANCE_PATH=instance-path,
        BATCH_RUN=YES
        <, STAGE_PATH=stage-path>);
```

Required Arguments*instance-path*

The path to the instance folder that was allocated by the %SEFCJIF macro. This can be an explicit path specification or can use the &sef_jif_path global macro variable that was returned by a previous invocation of the %SEFCJIF macro. This path must exist before running the %SEFDG macro.

For more information, see “%SEFCJIF Macro” on page 240.

BATCH_RUN=YES

Indicates that a record needs to be processed so that it appears in the user interface.

Optional Argument*stage-path*

The path to the input data, such as the load data, weather data, and so on. For more information, see “Input Path for SAS Input Data Source” on page 11.

Example

```
%sefdg(instance_path=&sef_jif_path,
       stage_path=c:/SEF_Data/input_data/zone1,
       batch_run=YES
       );
```

See Also

- “Run a Diagnose” on page 222
- “%SEFCJDF Macro” on page 238
- “Create the Definition Folder for the Diagnose” on page 218

%SEFML Macro**Overview**

Runs the forecast defined by the %SEFCJDF macro.

Syntax

```
%SEFML(INSTANCE_PATH=instance-path,
        BATCH_RUN=YES
        <, DIAGNOSE_PATH=diagnose-path>
        <, STAGE_PATH=stage-path>
        <, MZD_RUN=YES | NO>);
```

Required Arguments*instance-path*

The path to the instance folder that was allocated by the %SEFCJIF macro. This can be an explicit path specification or can use the &sef_jif_path global macro variable that was returned by a previous invocation of the %SEFCJIF macro. This path must exist before running the %SEFDG macro.

For more information, see “%SEFCJIF Macro” on page 240.

BATCH_RUN=YES

Indicates that a record needs to be processed so that it appears in the user interface.

Optional Arguments

diagnose-path

The value of the global variable `&sef_jif_path` whose value is returned by the `%SEFCJIF` macro. You must run the `%SEFCJIF` to create a diagnose instance folder before running a diagnose job. For more information, see “[%SEFCJIF Macro](#)” on page 240.

The value of the global variable `&sef_jif_path` is the path to the diagnose instance folder that was allocated by the `%SEFCJIF` macro. For more information, see “[Diagnose Instance Folder](#)” on page 153.

If you do not specify this argument, the default is the latest instance of the diagnose run that the forecast is owned by (that is, the folder for the parent diagnose).

stage-path

The path to the input data, such as the load data, weather data, and so on. For more information, see “[Input Path for SAS Input Data Source](#)” on page 11.

If this argument is not specified, the `%SEFDG` macro assumes that the input data is in the stage folder of the project data path.

YES | NO

Indicates whether this run is part of a multi-zone diagnose. The default is NO.

Example

```
%sefml(instance_path=&sef_jif_path,
       stage_path=c:/SEF_Data/input_data/zone1
       batch_run=Yes
       );
```

See Also

- “[Run a Forecast](#)” on page 227
- “[%SEFCJDF Macro](#)” on page 238
- “[Create the Definition Folder for the Forecast](#)” on page 223

%SEFREC Macro

Overview

Runs a reconciliation for a geographical hierarchy.

Syntax

```
%SEFREC(INSTANCE_PATH=instance-path,
        BATCH_RUN=YES);
```

Required Arguments

instance-path

The path to the instance folder that was allocated by the `%SEFCJIF` macro. This can be an explicit path specification or can use the `&sef_jif_path` global macro variable that was returned by a previous invocation of the `%SEFCJIF` macro. This path must exist before running the `%SEFDG` macro.

For more information, see “[%SEFCJIF Macro](#)” on page 240.

BATCH_RUN=YES

Indicates that a record needs to be processed so that it appears in the user interface.

Example

```
%sefrec(instance_path=&sef_jif_path,
        batch_run=YES
        );
```

See Also

- [“Run a Reconciliation” on page 228](#)
- [Chapter 17, “Forecasting a Geographical Hierarchy,” on page 93](#)
- [“Run a Reconciliation” on page 228](#)

%SEFRMZF Macro

Overview

Runs the forecasts that belong to multi-zone diagnose.

Syntax

```
%SEFRMZF (DATAMART_PATH=datamart-path,
          BATCH_RUN=YES
          <, DIAGNOSE_PATH=diagnose-path>);
```

Required Arguments

datamart-path

The root path for the data mart for the project.

BATCH_RUN=YES

Indicates that a record needs to be processed so that it appears in the user interface.

Optional Argument

diagnose-path

The path to the parent diagnose.

Example

```
%sefrmzf(datamart_path=C:\SEF_datamarts\EF_datamart_zone1,
          diagnose_path=C:\SEF_datamarts\EF_datamart_zone1\Diag_Z1MZD,
          batch_run=YES
          );
```

%SEFSH Macro

Overview

Runs the forecast defined by the %SEFCJDF macro.

Syntax

```
%SEFSH(INSTANCE_PATH=instance-path,
        BATCH_RUN=YES
```

```
<, STAGE_PATH=stage-path>
<, DIAGNOSE_PATH=diagnose-path>);
```

Required Arguments

instance-path

The path to the instance folder that was allocated by the %SEFCJIF macro. This can be an explicit path specification or can use the &sef_jif_path global macro variable that was returned by a previous invocation of the %SEFCJIF macro. This path must exist before running the %SEFDG macro.

For more information, see “%SEFCJIF Macro” on page 240.

BATCH_RUN=YES

Indicates that a record needs to be processed so that it appears in the user interface.

Optional Arguments

stage-path

The path to the input data, such as the load data, weather data, and so on. For more information, see “Input Path for SAS Input Data Source” on page 11.

If this argument is not specified, the %SEFDG macro assumes that the input data is in the stage folder of the project data path.

diagnose-path

The value of the global variable &sef_jif_path whose value is returned by the %SEFCJIF macro. You must run the %SEFCJIF to create a diagnose instance folder before running a diagnose job. For more information, see “%SEFCJIF Macro” on page 240.

The value of the global variable &sef_jif_path is the path to the diagnose instance folder that was allocated by the %SEFCJIF macro. For more information, see “Diagnose Instance Folder” on page 153.

If you do not specify this argument, the default is the latest instance of the diagnose run that the forecast is owned by (that is, the folder for the parent diagnose).

Example

```
%sefsh(instance_path=&sef_jif_path,
       stage_path=c:/SEF_Data/input_data/zone1
       batch_run=YES
       );
```

See Also

- “Run a Forecast” on page 227
- “%SEFCJDF Macro” on page 238
- “Create the Definition Folder for the Forecast” on page 223

%SEFVS Macro

Overview

Runs the forecast defined by the %SEFCJDF macro.

Syntax

```
%SEFVS(INSTANCE_PATH=instance-path,
BATCH_RUN=YES
<, STAGE_PATH=stage-path>
<, DIAGNOSE_PATH=diagnose-path>);
```

Required Arguments*instance-path*

The path to the instance folder that was allocated by the %SEFCJIF macro. This can be an explicit path specification or can use the &sef_jif_path global macro variable that was returned by a previous invocation of the %SEFCJIF macro. This path must exist before running the %SEFDG macro.

For more information, see [“%SEFCJIF Macro” on page 240](#).

BATCH_RUN=YES

Indicates that a record needs to be processed so that it appears in the user interface.

Optional Arguments*stage-path*

The path to the input data, such as the load data, weather data, and so on. For more information, see [“Input Path for SAS Input Data Source” on page 11](#).

If this argument is not specified, the %SEFDG macro assumes that the input data is in the stage folder of the project data path.

diagnose-path

The value of the global variable &sef_jif_path whose value is returned by the %SEFCJIF macro. You must run the %SEFCJIF to create a diagnose instance folder before running a diagnose job. For more information, see [“%SEFCJIF Macro” on page 240](#).

The value of the global variable &sef_jif_path is the path to the diagnose instance folder that was allocated by the %SEFCJIF macro. For more information, see [“Diagnose Instance Folder” on page 153](#).

If you do not specify this argument, the default is the latest instance of the diagnose run that the forecast is owned by (that is, the folder for the parent diagnose).

Example

```
%sefvs(instance_path=&sef_jif_path,
        stage_path=c:/SEF_Data/input_data/zone1
        );
```

See Also

- [“Run a Forecast” on page 227](#)
- [“%SEFCJDF Macro” on page 238](#)
- [“Create the Definition Folder for the Forecast” on page 223](#)

*Appendix 4***Error Analysis Equations**

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Error

$$Error = y_i - \hat{y}_i$$

AE (Absolute Error)

$$AE = |y_i - \hat{y}_i|$$

MAE (Mean Absolute Error)

$$MAE = \frac{1}{N} \sum_{i=1}^N |y_i - \hat{y}_i|$$

APE (Absolute Percentage Error)

$$APE = \left| \frac{y_i - \hat{y}_i}{y_i} \right|$$

MAPE (Mean Absolute Percentage Error)

$$MAPE = \frac{1}{N} \sum_{i=1}^N \left| \frac{y_i - \hat{y}_i}{y_i} \right|$$

Appendix 5

Parameters

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Diagnose Parameters

Main Parameters: Periods

Training Start Date

The start date of the historical data to be used to “train” the diagnose model. Set the start date of training data to be equal to or later than the latest start date of the utility’s historical load, weather, and other data (the total input of historical data that is available).

The training period is the time between the **Training Start Date** and the **Holdout Start Date**. You must have at least one year of data for model training to produce diagnose models for a complete year. Two years of data produce diagnose models which better reflect seasonality, and three years is better. Longer training periods might be needed for long-term forecasts.

For information, see [“Data Input and Period Parameters for a Diagnose”](#) on page 52.

Holdout Start Date

The start date of the holdout period (the difference between **Holdout Start Date** and **Holdout End Date**).

The **Holdout Start Date** must be at least 12 months later than the **Training Start Date**.

Note: How you specify the holdout period can affect how long it takes to run a very short-term forecast. For more information, see [“Diagnose Parameter Selection and Forecast Performance”](#) on page 80.

For information, see [“Data Input and Period Parameters for a Diagnose”](#) on page 52.

Holdout End Date

The end date of the holdout period (difference between **Holdout Start Date** and **Holdout End Date**).

Suggested lengths:

- **Very-Short-Term:** Last seven days of data

Note: How you specify the holdout period can affect how long it takes to run a very short-term forecast. For more information, see [“Diagnose Parameter Selection and Forecast Performance”](#) on page 80.

- **Short-Term:** Last 30 days of data
- **Medium Term/Long Term:** Minimum one year, and two to three years preferred

For short-term and very short-term forecasts, generally the holdout period should be at least as long as the forecast horizon (the period to forecast).

For information, see [“Data Input and Period Parameters for a Diagnose”](#) on page 52.

Main Parameters: Weights

Weight

The number of weights used to calculate the weighted average temperature in the Recency model. The calculation is exponentially smoothed.

You can choose up to four different models for calculating the weighted average temperature based on up to four corresponding weights. Valid values are 1, 2, 3, or 4. Default is 4.

If you set **Weight** to 1, then, **Weight Lower** should equal **Weight Upper**.

Weight Lower

The lower boundary of the weight used to calculate the exponentially smoothed temperature in the Recency mode. Valid values are between 0.8 and 1. Default is 0.8.

Weight Upper

The upper boundary of the weight used to calculate the exponentially smoothed temperature in the Recency mode. Valid values are between 0.8 and 1. Default is 0.95.

Note: If the number of weights is 1, then **Weight Lower** should equal **Weight Upper**.

MAPE Parameters: Type**MAPE**

The criterion for ranking models.

Note:

- **ME:** Mean error
- **MAE:** Mean absolute error
- **MAPE:** Mean absolute percentage error

For more information, see [“MAPE Parameters” on page 17](#).

See Also

[Appendix 4, “Error Analysis Equations,” on page 249](#)

MAPE Parameters: Weights

Weight parameters apply only if you selected **weight_mape** as the type of MAPE to use for choosing the best model.

Weight Hourly MAPE

Weighted Hourly Mean Absolute Percentage Error

The weight assigned to hourly MAPE in calculating **weighted_mape**. The weight must be less than or equal to 1 and the sum of all weights must equal to 1. Enter a decimal value rather than a percentage value. For example, 0.1 rather than 10%.

Note: This parameter applies only if you select **weighted_mape** as the type of MAPE to use in choosing the best model.

Weight Daily MAPE

Weighted Daily Mean Absolute Percentage Error

The weight assigned to daily energy MAPE in calculating **weighted_mape**. The weight must be less than or equal to 1 and the sum of all weights must equal to 1. Enter a decimal value rather than a percentage value. For example, 0.1 rather than 10%.

Note: This parameter applies only if you select **weighted_mape** as the type of MAPE to use in choosing the best model.

Weight Daily Peak MAPE

Weighted Daily Peak Mean Absolute Percentage Error

The weight assigned to daily peak MAPE in calculating **weighted_mape**. The weight must be less than or equal to 1 and the sum of all weights must equal to 1. Enter a decimal value rather than a percentage value. For example, 0.1 rather than 10%.

Note: This parameter applies only if you select **weighted_mape** as the type of MAPE to use in choosing the best model.

Weight Monthly MAPE

Weighted Monthly Mean Absolute Percentage Error

The weight assigned to monthly energy MAPE in calculating **weighted_mape**. The weight must be less than or equal to 1 and the sum of all weights must equal to 1. Enter a decimal value rather than a percentage value. For example, 0.1 rather than 10%.

Note: This parameter applies only if you select **weighted_mape** as the type of MAPE to use in choosing the best model.

Weight Monthly Peak MAPE

Weighted Monthly Peak Mean Absolute Percentage Error

The weight assigned to monthly peak MAPE in calculating **weighted_mape**. The weight must be less than or equal to 1 and the sum of all weights must equal to 1. Enter a decimal value rather than a percentage value. For example, 0.1 rather than 10%.

Note: This parameter applies only if you select **weighted_mape** as the type of MAPE to use in choosing the best model.

Weight Annual MAPE

Weighted Annual Mean Absolute Percentage Error

The weight assigned to annual energy MAPE in calculating **weighted_mape**. The weight must be less than or equal to 1 and the sum of all weights must equal to 1. Enter a decimal value rather than a percentage value. For example, 0.1 rather than 10%.

Note: This parameter applies only if you select **weighted_mape** as the type of MAPE to use in choosing the best model.

Weight Annual Peak MAPE

Weighted Annual Peak Mean Absolute Percentage Error

The weight assigned to annual peak MAPE in calculating **weighted_mape**. The weight must be less than or equal to 1 and the sum of all weights must equal to 1. Enter a decimal value rather than a percentage value. For example, 0.1 rather than 10%.

Note: This parameter applies only if you select **weighted_mape** as the type of MAPE to use in choosing the best model.

MAPE Improvement

The value above which the model MAPE improvement is the forecasting improvement considered to be significant. The default value is 0.0001.

Note: This parameter applies only if you select **weighted_mape** as the type of MAPE to use in choosing the best model.

Advanced Parameters

Outlier Percent

The percentage of observations that are to be considered as outliers. The default value is 0.001, which means the generated outlier table includes the top 0.1 percent of all observations with the largest forecast absolute error (AE).

Note: Enter the number as a decimal value rather than as a percentage. For example, enter 0.001 rather than 0.1%.

The value that you specify for **APE Cutoff** then sets a percentage limit on which of the outliers are chosen.

Residual History Length

The length of time during which to calculate the residual used in the two-stage model (integer value with unit of hour). The default value is 504, which means using the residual of the past (21 days; three weeks) of the holdout period. The residual is the difference between the estimated value and the actual value. This parameter does not apply to a one-stage model.

The residual history period is also used in the forecast process for re-estimating final two-stage models. The residual history period is a subset of the training period, which is the calendar period between the **Historical Start Date** and the **Forecast Start Date**.

Note: Choosing too short a residual history length can have the result that values do not converge. A length of around 500 hours should be adequate. Choosing a much longer length causes excessive processing time with insignificant gain in precision.

For information, see [“Data Input and Period Parameters for a Diagnose”](#) on page 52.

Combine Forecast

The two-stage model(s) that are averaged to calculate the combined forecast. The value for this parameter is various combinations of 1, 2, 3 and 4.

1: GLM_ARIMA (auto regressive integrated moving average)

2: GLM_ESM (exponential smoothing modeling)

3: GLM_UCM (unobserved components modeling)

4: GLM_NN (neural network)

For example, 124 means use GLM_ARIMA, GLM_ESM, and GLM_NN to calculate the combined forecast.

The default value is 1234 and the combined forecast is calculated only if the two-stage models are enabled.

Poly Order

Control using second or third order polynomial of the temperature variables in the model. The value of this parameter should be either 2 or 3. A selection of 2 does not allow the cubed temperature variable in models.

APE Cutoff

The observations that are put into the outlier table. Observations with absolute percentage error greater than this threshold are put into the table.

Note: Enter the number as a decimal value rather than as a percentage. For example, enter 0.05 rather than 5%.

The value that you enter for **Outlier Percent** determines the percentage of observations that are considered as outliers.

Two Stage

Run a two-stage model.

Here are the valid values:

- **YES**: Run the two-stage model.
Note: To minimize run time, do not select **YES** for medium-term/long-term forecasting because the two-stage models are not used.
- **NO**: Run the one-stage model.

For information about two-stage forecasting, see:

- [“Two-Stage Short-Term Forecasting” on page 67](#)
- [“Two-Stage Very Short-Term Forecasting” on page 63](#)

Default Weather Type Code

The type of data contained in the WTHR_NO field of the weather data source file.

Note: This parameter applies only to a weather table in 3.1 data model format. For more information, see [“Weather Data Table” on page 173](#).

Here are the valid values:

- **TEMPF**: Fahrenheit
- **TEMPC**: Centigrade

WLS

Include the weighted least squares (WLS) model for consideration in the diagnose.

Note: The WLS option tends to require a considerable amount of time and does not improve accuracy in most cases. It is recommended that this option not be selected during production runs.

Additional Modeling Variables

The variables that are used in the MODEL statement of PROC GLM as independent effects.

You can also include other effects such as regressor, main, crossed, and nested. For more information, see "Specification of Effects" in *SAS/STAT 14.1 User's Guide: The GLM Procedure* located at: <http://support.sas.com/documentation/onlinedoc/stat/141/glm.pdf>.

Separate multiple variables with a single blank. Do not use quotation marks.

For more information, see [Chapter 26, “Add Additional Variables as Parameters,” on page 183](#).

Note: The dates of additional data must be within the training period (the interval between the **Training Start Date** and the **Holdout Start Date**). For more information, see [“Data Input and Period Parameters for a Diagnose” on page 52](#).

Additional Class Variables

A class variable. Variables that you specify in this field are used in the CLASS statement of PROC GLM as additional class variables. For more information, see [Chapter 26, “Add Additional Variables as Parameters,” on page 183](#).

Separate multiple variables with a single blank. Do not use quotation marks.

System Parameters

Number of CPUs Allocated to SAS Energy Forecasting

The number of available CPU cores allocated to SAS Energy Forecasting.

SAS Energy Forecasting can run parallel processing, which significantly reduces processing time.

Fixed Date Holidays

The numeric code for each holiday whose calendar date does not differ from year to year. Separate each numeric code with a blank. The default for the US calendar is 1 5 8 10.

- **1**: New Year's Day (January 1)
- **5**: Independence Day (July 4)
- **8**: Veterans Day (November 11)
- **10**: Christmas (December 25)

Diagnose Initialization Exit

This parameter is optional.

The path and filename of a SAS program or macro that SAS Energy Forecasting invokes before the diagnose is run. For example: `C:\hana\init.sas`.

Typically, you can use such a program to allocate resources and make connections that might be needed for the diagnose.

Note: If you specify such a program, then you probably want also to specify a program with **Diagnose Completion Exit** to free the resources and connections made during initialization.

Diagnose Completion Exit

This parameter is optional.

The path and filename of a SAS program or macro that SAS Energy Forecasting invokes after the diagnose is finished. For example: `C:\hana\terminate.sas`.

Typically, you can use such a program to free resources and connections that you made with your program specified in **Diagnose Initialization Exit**.

Delete Copied Source Data After Run

Delete the copied source data after the run.

Each time a forecast is run, the source data files from the input path are copied before running a diagnose. This requires disk space. You can choose to delete the copied data after the diagnose has run.

Note: If you want to backcast, set this parameter to No. The source data is required to capture actual and forecasted temperature and loads.

Very Short-Term Forecasting Parameters

Main Parameters

Enable Event Listening to Automate Forecasts

Enable forecasts to be run automatically using this forecast definition. A forecast is run each time that an external event is triggered.

You can select **Enable event listening to automate forecasts** for any forecast.

For information, see [Appendix 2, “Run an Event-Triggered Forecast,” on page 211](#).

Performance-Optimized Forecast

Bypass some parameter re-estimation. For more information, see [“Optimize the Performance of a Very Short-Term Forecast” on page 20](#).

Historical Start Date

The start date of a period of historical data that is to be used as a training period for re-estimating final models. The training period is the calendar period between the **Historical Start Date** and the **Forecast Start Date**.

Note: The **Forecast Start Date** should be at least 12 months later than the **Historical Start Date**—a full year of history is required for re-estimating the model parameters.

For information, see [“Data Input and Period Parameters for a Diagnose” on page 52](#).

Forecast Start Date

The start date for the forecast horizon.

Note: The **Forecast Start Date** should be at least 12 months later than the **Historical Start Date**—a full year of history is required for re-estimating the model parameters.

For information, see [“Data Input and Period Parameters for a Diagnose” on page 52](#).

Forecast Start Hour

The start hour for the forecast horizon (between 1 and 24).

For information, see [“Data Input and Period Parameters for a Diagnose” on page 52](#).

Forecast Length

The length for the forecast horizon, which is the number of hours to be forecasted (integer value).

Increment Minute

The forecast start hour for forecasts run with the %SEFDATAE macro.

Note: **Increment Minute** is available only if you select **Enable event listening**.

The number of minutes that you specify determines whether the forecast start hour is taken to be the hour that you run the %SEFDATAE macro or the hour after you run the macro.

For more information, see [Appendix 2, “Run an Event-Triggered Forecast,” on page 211](#).

Auto-Backcast

Enable backcasting to be done automatically each time a new event-triggered forecast is run. For more information, see [Appendix 2, “Run an Event-Triggered Forecast,”](#) on page 211.

Note: **Auto-Backcast** is available only if you have select **Enable event listening**. Auto-backcast applies only to short-term and very short-term forecasting.

For more information about backcasting, see [Chapter 16, “Backcasting,”](#) on page 87.

Report Data Parameters**Reporting Mart**

The format of output data.

For more information, see [Chapter 20, “Producing Reports,”](#) on page 111.

Reporting SAS Data Model

The method to create report data.

- **Normalized:** Create more, but smaller, tables which you must join for reporting purposes.
- **Denormalized:** Create fewer, but larger, tables.
- **Both:** Create both normalized and denormalized files.

For information, see [Chapter 20, “Producing Reports,”](#) on page 111.

HANA Reporting Server

The machine that is hosting the SAP HANA database.

For information, see [Chapter 28, “Work with SAP HANA,”](#) on page 187.

HANA Reporting Instance

The instance of the SAP HANA database.

For information, see [Chapter 28, “Work with SAP HANA,”](#) on page 187.

HANA Reporting Schema

The schema for the SAP HANA database that describes the HANA tables to be created by SAS Energy Forecasting.

For information, see [“Create an SAP HANA Schema”](#) on page 190.

HANA Reporting Authentication Domain

The SAP HANA authentication domain.

For general information, see [Chapter 28, “Work with SAP HANA,”](#) on page 187.

For specific information, see [Step 8d](#) on page 189.

System Parameters**Forecast Initialization Exit**

This parameter is intended primarily for internal SAS use.

The path and file name of a SAS program or macro that SAS Energy Forecasting invokes before the forecast is run. For example: `C:\hana\init.sas`.

Typically, you can use such a program to allocate resources and connections that you need to run the forecast.

Note: If you specify such a program, then you probably want also to specify a program with **Forecast Completion Exit** to free the resources and connections made during initialization.

Reporting Exit

This parameter is intended primarily for internal SAS use.

The path and file name of a SAS program or macro that SAS Energy Forecasting invokes after the forecast is run but before data is written out either to SAS data sets or to a SAP HANA for reporting. For example: `C:\hana\report.sas`.

Forecast Completion Exit

This parameter is intended primarily for internal SAS use.

The path and file name of a SAS program or macro that SAS Energy Forecasting invokes after the forecast is finished. For example: `C:\hana\terminate.sas`.

Typically, you can use such a program to free resources and connections that you made with your program specified in **Forecast Initialization Exit**.

Delete Copied Source Data After Run

Delete the copied source data after the run.

Each time a forecast is run, the source data files from the input path are copied before running a diagnose. This requires disk space. You can choose to delete the copied data after the diagnose has run.

Note: If you want to backcast, set this parameter to No. The source data is required to capture actual and forecasted temperature and loads.

Short-Term Forecasting Parameters

Main Parameters

Historical Start Date

The start date of a period of historical data that is to be used as a training period for re-estimating final models. The training period is the calendar period between the **Historical Start Date** and the **Forecast Start Date**.

Note: The **Forecast Start Date** should be at least 12 months later than the **Historical Start Date**—a full year of history is required for re-estimating the model parameters.

For information, see [“Data Input and Period Parameters for a Diagnose” on page 52](#).

Forecast Start Date

The start date for the forecast horizon.

Note: The **Forecast Start Date** should be at least 12 months later than the **Historical Start Date**—a full year of history is required for re-estimating the model parameters.

For information, see [“Data Input and Period Parameters for a Diagnose”](#) on page 52.

Forecast End Date

The end date for the forecast horizon, which should be:

- the same as or later than the start date for the forecast horizon
- and less than or equal to the end date of the forecasted temperature data.

The load to the last hour of this day is forecasted.

For information, see [“Data Input and Period Parameters for a Diagnose”](#) on page 52.

Enable Event Listening to Automate Forecasts

Enable forecasts to be run automatically using this forecast definition. A forecast is run each time that an external event is triggered.

You can select **Enable event listening to automate forecasts** for any forecast.

For information, see [Appendix 2, “Run an Event-Triggered Forecast,”](#) on page 211.

Increment Hour

The forecast start date for forecasts run with the %SEFDATAE macro.

Note: **Increment Hour** is available only if you select **Enable event listening**.

The number of hours that you specify determines whether the forecast start date is taken to be the day that you run the %SEFDATAE macro or the day after you run the macro.

For more information, see [Appendix 2, “Run an Event-Triggered Forecast,”](#) on page 211.

Auto-Backcast

Enable backcasting to be done automatically each time a new event-triggered forecast is run. For more information, see [Appendix 2, “Run an Event-Triggered Forecast,”](#) on page 211.

Note: **Auto-Backcast** is available only if you have select **Enable event listening**. Auto-backcast applies only to short-term and very short-term forecasting.

For more information about backcasting, see [Chapter 16, “Backcasting,”](#) on page 87.

Report Data Parameters

Reporting Mart

The format of output data.

For more information, see [Chapter 20, “Producing Reports,”](#) on page 111.

Reporting SAS Data Model

The method to create report data.

- **Normalized:** Create more, but smaller, tables which you must join for reporting purposes.
- **Denormalized:** Create fewer, but larger, tables.
- **Both:** Create both normalized and denormalized files.

For information, see [Chapter 20, “Producing Reports,”](#) on page 111.

HANA Reporting Server

The machine that is hosting the SAP HANA database.

For information, see [Chapter 28, “Work with SAP HANA,”](#) on page 187.

HANA Reporting Instance

The instance of the SAP HANA database.

For information, see [Chapter 28, “Work with SAP HANA,”](#) on page 187.

HANA Reporting Schema

The schema for the SAP HANA database that describes the HANA tables to be created by SAS Energy Forecasting.

For information, see [“Create an SAP HANA Schema”](#) on page 190.

HANA Reporting Authentication Domain

The SAP HANA authentication domain.

For general information, see [Chapter 28, “Work with SAP HANA,”](#) on page 187.

For specific information, see [Step 8d](#) on page 189.

System Parameters

Forecast Initialization Exit

This parameter is intended primarily for internal SAS use.

The path and file name of a SAS program or macro that SAS Energy Forecasting invokes before the forecast is run. For example: `C:\hana\init.sas`.

Typically, you can use such a program to allocate resources and connections that you need to run the forecast.

Note: If you specify such a program, then you probably want also to specify a program with **Forecast Completion Exit** to free the resources and connections made during initialization.

Reporting Exit

This parameter is intended primarily for internal SAS use.

The path and file name of a SAS program or macro that SAS Energy Forecasting invokes after the forecast is run but before data is written out either to SAS data sets or to a SAP HANA for reporting. For example: `C:\hana\report.sas`.

Forecast Completion Exit

This parameter is intended primarily for internal SAS use.

The path and file name of a SAS program or macro that SAS Energy Forecasting invokes after the forecast is finished. For example: `C:\hana\terminate.sas`.

Typically, you can use such a program to free resources and connections that you made with your program specified in **Forecast Initialization Exit**.

Delete Copied Source Data After Run

Delete the copied source data after the run.

Each time a forecast is run, the source data files from the input path are copied before running a diagnose. This requires disk space. You can choose to delete the copied data after the diagnose has run.

Note: If you want to backcast, set this parameter to No. The source data is required to capture actual and forecasted temperature and loads.

Medium-Term/Long-Term Forecasting Parameters

Main Parameters for Probabilistic Forecasting

Enable Event Listening to Automate Forecasts

Enable forecasts to be run automatically using this forecast definition. A forecast is run each time that an external event is triggered.

You can select **Enable event listening to automate forecasts** for any forecast.

For information, see [Appendix 2, “Run an Event-Triggered Forecast,” on page 211](#).

Forecast Type

The type of medium-term/long-term forecast.

Here are the valid values:

- **Probabilistic forecasting:** Multiple years of historical weather are used to produce a range of hourly energy forecasts that can be described probabilistically for each hour. For more information, see [“Probabilistic Forecasting” on page 70](#).
- **Point forecasting:** A single year of typical hourly weather data (which you must provide) is used to produce a single energy load forecast. For more information, see [“Point Forecasting” on page 72](#).

Historical Temperature Start

The start date for the historical temperature data, which should be equal to or greater than the start date of the utility’s historical temperature data.

For information, see [“Data Input and Period Parameters for Probabilistic Forecasting” on page 70](#).

Historical Temperature End

The end date for the historical temperature data, which should be less than or equal to the end date of the utility’s temperature data. Ideally, you have 30 years of temperature data, but use what you have.

For information, see [“Data Input and Period Parameters for Probabilistic Forecasting” on page 70](#).

Historical Load Start Date

The start date for history. The calendar period between the **Historical Load Start Date** and **Historical Load End Date** ([“Historical Load End Date” on page 265](#)) sets the

training period for the re-estimation of parameters for medium-term and long-term models.

For information, see [“Data Input and Period Parameters for Point Forecasting” on page 73](#) and [“Data Input and Period Parameters for Probabilistic Forecasting” on page 70](#).

Historical Load End Date

The end date for history. Set the end date to be at least 12 months after the start date—one year of historical data is required.

For information, see [“Data Input and Period Parameters for Point Forecasting” on page 73](#) and [“Data Input and Period Parameters for Probabilistic Forecasting” on page 70](#).

Forecast End Date

The end date for the forecast horizon, which should be:

- the same as or later than the start date for the forecast horizon
- and less than or equal to the end date of the economic data.

The calendar period between the **Historical Load End Date** ([“Historical Load End Date” on page 265](#)) and the **Forecast End Date** defines the forecast period. The load to the last hour of this day is forecast.

For information, see [“Data Input and Period Parameters for Point Forecasting” on page 73](#) and [“Data Input and Period Parameters for Probabilistic Forecasting” on page 70](#).

Scenarios

The number that represents the specific economic scenarios to use. The value is any combination of the integers between 0 and 6, separated by spaces.

For example, 0 denotes the base scenario. 0 2 5 denotes the base scenario, scenario 2, and scenario 5.

MLT Assumption

The method by which GXP (gross x product) is included in the forecast model.

Here are the valid values:

- 1: Include GXP as Trend
- 2: Include GXP as Trend and Interact GXP with other factors
- 3: Divide Load by GXP

For more information, see [Chapter 13, “Medium-Term/Long-Term Forecasting,” on page 69](#).

Main Parameters for Point Forecasting

Enable Event Listening to Automate Forecasts

Enable forecasts to be run automatically using this forecast definition. A forecast is run each time that an external event is triggered.

You can select **Enable event listening to automate forecasts** for any forecast.

For information, see [Appendix 2, “Run an Event-Triggered Forecast,” on page 211](#).

Forecast Type

The type of medium-term/long-term forecast.

Here are the valid values:

- **Probabilistic forecasting:** Multiple years of historical weather are used to produce a range of hourly energy forecasts that can be described probabilistically for each hour. For more information, see [“Probabilistic Forecasting” on page 70](#).
- **Point forecasting:** A single year of typical hourly weather data (which you must provide) is used to produce a single energy load forecast. For more information, see [“Point Forecasting” on page 72](#).

Historical Load Start Date

The start date for history. The calendar period between the **Historical Load Start Date** and **Historical Load End Date** ([“Historical Load End Date” on page 265](#)) sets the training period for the re-estimation of parameters for medium-term and long-term models.

For information, see [“Data Input and Period Parameters for Point Forecasting” on page 73](#) and [“Data Input and Period Parameters for Probabilistic Forecasting” on page 70](#).

Historical Load End Date

The end date for history. Set the end date to be at least 12 months after the start date— one year of historical data is required.

For information, see [“Data Input and Period Parameters for Point Forecasting” on page 73](#) and [“Data Input and Period Parameters for Probabilistic Forecasting” on page 70](#).

Forecast End Date

The end date for the forecast horizon, which should be:

- the same as or later than the start date for the forecast horizon
- and less than or equal to the end date of the economic data.

The calendar period between the **Historical Load End Date** ([“Historical Load End Date” on page 265](#)) and the **Forecast End Date** defines the forecast period. The load to the last hour of this day is forecast.

For information, see [“Data Input and Period Parameters for Point Forecasting” on page 73](#) and [“Data Input and Period Parameters for Probabilistic Forecasting” on page 70](#).

Scenarios

The number that represents the specific economic scenarios to use. The value is any combination of the integers between 0 and 6, separated by spaces.

For example, 0 denotes the base scenario. 0 2 5 denotes the base scenario, scenario 2, and scenario 5.

MLT Assumption

The method by which GXP (gross x product) is included in the forecast model.

Here are the valid values:

- **1:** Include GXP as Trend
- **2:** Include GXP as Trend and Interact GXP with other factors
- **3:** Divide Load by GXP

For more information, see [Chapter 13, “Medium-Term/Long-Term Forecasting,”](#) on page 69.

Report Data Parameters

Reporting Mart

The format of output data.

For more information, see [Chapter 20, “Producing Reports,”](#) on page 111.

Reporting SAS Data Model

The method to create report data.

- **Normalized:** Create more, but smaller, tables which you must join for reporting purposes.
- **Denormalized:** Create fewer, but larger, tables.
- **Both:** Create both normalized and denormalized files.

For information, see [Chapter 20, “Producing Reports,”](#) on page 111.

HANA Reporting Server

The machine that is hosting the SAP HANA database.

For information, see [Chapter 28, “Work with SAP HANA,”](#) on page 187.

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HANA Reporting Schema

The schema for the SAP HANA database that describes the HANA tables to be created by SAS Energy Forecasting.

For information, see [“Create an SAP HANA Schema”](#) on page 190.

HANA Reporting Authentication Domain

The SAP HANA authentication domain.

For general information, see [Chapter 28, “Work with SAP HANA,”](#) on page 187.

For specific information, see [Step 8d on page 189.](#)

Advanced Parameters

Run Naïve Benchmark Model

Run the naïve model.

Run Recency Effect Model

Run the recency model.

Run Weekend Effect Model

Run the weekend model.

Run Holiday Effect Model

Run the holiday model.

System Parameters**Forecast Initialization Exit**

This parameter is intended primarily for internal SAS use.

The path and file name of a SAS program or macro that SAS Energy Forecasting invokes before the forecast is run. For example: `C:\hana\init.sas`.

Typically, you can use such a program to allocate resources and connections that you need to run the forecast.

Note: If you specify such a program, then you probably want also to specify a program with **Forecast Completion Exit** to free the resources and connections made during initialization.

Reporting Exit

This parameter is intended primarily for internal SAS use.

The path and file name of a SAS program or macro that SAS Energy Forecasting invokes after the forecast is run but before data is written out either to SAS data sets or to a SAP HANA for reporting. For example: `C:\hana\report.sas`.

Forecast Completion Exit

This parameter is intended primarily for internal SAS use.

The path and file name of a SAS program or macro that SAS Energy Forecasting invokes after the forecast is finished. For example: `C:\hana\terminate.sas`.

Typically, you can use such a program to free resources and connections that you made with your program specified in **Forecast Initialization Exit**.

Delete Copied Source Data After Run

Delete the copied source data after the run.

Each time a forecast is run, the source data files from the input path are copied before running a diagnose. This requires disk space. You can choose to delete the copied data after the diagnose has run.

Note: If you want to backcast, set this parameter to No. The source data is required to capture actual and forecasted temperature and loads.

Reconciliation Parameters

Main Parameters

Reconciliation Method Type

The reconciliation method type.

- **Bottom-Up:** Maintains unchanged the predicted load for lower-level utilities. Adjust the predicted load value for the topmost zone so as to be consistent with lower-level utilities.
- **Top-Down:** Maintains unchanged the predicted load for the topmost zone. Adjust the predicted loads for the lower-level utilities so as to be consistent with the topmost.

Disaggregation

The method to control how the aggregation error is apportioned when doing top-down reconciliation.

Here are the valid values:

- **Proportions:** The reconciled forecast is determined by proportionally spreading the aggregation error among the lower-level forecasts based on how much each forecast represents in the total sum of the lower-level forecasts.
- **Difference:** The reconciled forecast is determined by equally splitting the aggregation error among the lower-level forecasts.

Forecast Type

The type of forecast to run.

Reconciliation Forecast Model

The model to use for the reconciliation.

Reconciliation Scenario

The scenario to use for the reconciliation.

System Parameters

Reconciliation Initialization Exit

This parameter is intended primarily for internal SAS use.

The path and file name of a SAS program or macro that SAS Energy Forecasting invokes before the forecast is run. For example: `C:\hana\init.sas`.

Typically, you can use such a program to allocate resources and connections that you need to run the forecast.

Note: If you specify such a program, then you probably want also to specify a program with **Forecast Completion Exit** to free the resources and connections made during initialization.

Reconciliation Completion Exit

This parameter is intended primarily for internal SAS use.

The path and file name of a SAS program or macro that SAS Energy Forecasting invokes after the forecast is finished. For example: **C:\hana\terminate.sas**.

Typically, you can use such a program to free resources and connections that you made with your program specified in **Forecast Initialization Exit**.

Appendix 6

Results Files

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Common Tables

Introduction

Certain tables are common to the results.

FCST_RESULTS Table

The FCST_RESULTS table contains forecast results for the best or selected model.

Here are the columns in the table:

Table A6.1 Columns in FCST_RESULTS Table

Column Name	Label
date	Date
datetime	Datetime
he	Hour Ending
predicted_load	Predicted Load

FCST_STAT Table

The FCST_STAT table contains forecast statistics such as MAE, MAPE, and ME for annual energy, annual peak load, daily energy, daily peak load, monthly energy, monthly peak load, and hourly load for various models.

Here are the columns in the table:

Table A6.2 Columns in FCST_STAT Table

Column Name	Label
annual_mae	Annual MAE
annual_mape	Annual MAPE
annual_me	Annual ME
annual_peak_mae	Monthly Peak MAE
annual_peak_mape	Monthly Peak MAPE
annual_peak_me	Monthly Peak ME

Column Name	Label
daily_mae	Daily MAE
daily_mape	Daily MAPE
daily_me	Daily ME
daily_peak_mae	Daily Peak MAE
daily_peak_mape	Daily Peak MAPE
daily_peak_me	Daily Peak ME
hourly_mae	Hourly MAE
hourly_mape	Hourly MAPE
hourly_me	Hourly ME
model_name	Model Name
monthly_mae	Monthly MAE
monthly_mape	Monthly MAPE
monthly_me	Monthly ME
monthly_peak_mae	Monthly Peak MAE
monthly_peak_mape	Monthly Peak MAPE
monthly_peak_me	Monthly Peak ME
weighted_mape	Weighted MAPE

FCST_RESULTS_ALL Table

The FCST_RESULTS_ALL table contains forecast results.

Here are the columns in the table:

Table A6.3 Columns in FCST_RESULTS_ALL Table

Column Name	Label
he	Hour Ending
date	Date

Column Name	Label
datetime	Datetime
predicted_load_combine	Combined Model Predicted Load
predicted_load_glm_arimax	GLM_ARIMAX Model Predicted Load
predicted_load_glm_esm	GLM_ESM Model Predicted Load
predicted_load_glm_nn	GLM_NN Model Predicted Load
predicted_load_glm_ucm	GLM_UCM Model Predicted Load
predicted_load_GLM	GLM Model Predicted Load

Diagnose Results

FCST_RESULTS Table

For information, see “[FCST_RESULTS Table](#)” on page 272.

FCST_RESULTS_ALL Table

The FCST_RESULTS_ALL table contains forecast results for these models:

- Naïve
- Recency effect
- Weekend effect
- Holiday effect
- WLS (weighted least squares), if the WLS model is enabled
- GLM_UCM (unobserved components modeling), if two-stage models are enabled
- GLM_NN (neural network), if two-stage models are enabled
- GLM_ESM (exponential smoothing modeling), if two-stage models are enabled
- GLM_ARIMA (auto regressive integrated moving average), if two-stage models are enabled
- COMBINE, if two-stage models are enabled

Here are the columns in the table:

Table A6.4 Columns in FCST_RESULTS_ALL Table

Column Name	Label
actual_load	Actual MW

Column Name	Label
date	Date
datetime	Datetime
he	Hour Ending
predicted_load_glmfb	Naive Model Predicted Load
predicted_load_glmfbr	Recency Effect Model Predicted Load
predicted_load_glmfbrw	Weekend Effect Model Predicted Load
predicted_load_glmfbrwh	Holiday Effect Model Predicted Load
predicted_load_glmfwebrwh	WLS Model Predicted Load
predicted_load_glm_esm	GLM_ESM Model Predicted Load
predicted_load_glm_arimax	GLM_ARIMAX Model Predicted Load
predicted_load_glm_ucm	GLM_UCM Model Predicted Load
predicted_load_glm_nn	GLM_NN Model Predicted Load
predicted_load_combine	Combined Model Predicted Load

FCST_STAT Table

The FCST_STAT table (see “FCST_STAT Table” on page 272) contains forecast statistics for these models:

- Naïve
- Recency effect
- Weekend effect
- Holiday effect
- WLS (weighted least squares), if the WLS model is enabled
- GLM_UCM (unobserved components modeling) if two-stage models are enabled
- GLM_NN (neural network) if two-stage models are enabled
- GLM_ESM (exponential smoothing modeling) if two-stage models are enabled
- GLM_ARIMA (auto regressive integrated moving average) if two-stage models are enabled
- COMBINE if two-stage models are enabled

HOLIDAY_LKP Table

The HOLIDAY_LKP table contains information to determine the significance of a date.

Here are the columns in the table:

Table A6.5 Columns in HOLIDAY_LKP Table

Column Name	Label
hgroup	hgroup
special_day	special_day
weekday	weekday

OUTLIER_TABLE_* Tables

The OUTLIER_TABLE_* tables contain the percentage of all observations (based on the “outlier_percent” parameter) with largest forecast absolute error for various models.

Here are the models:

- OUTLIER_TABLE_GLMF: Naïve
- OUTLIER_TABLE_HOLIDAY: Holiday effect
- OUTLIER_TABLE_NAIVE: Naïve
- OUTLIER_TABLE_RECENCY: Recency effect
- OUTLIER_TABLE_RT0: Recency effect (step that adds simple moving average of temperature during preceding 24 hours)
- OUTLIER_TABLE_RT1: Recency effect (step that adds preceding hour's temperature)
- OUTLIER_TABLE_RT2: Recency effect (step that changes interaction effects)
- OUTLIER_TABLE_RT3: Recency effect (step that changes more interaction effects)
- OUTLIER_TABLE_RT4: Recency effect (step that replaces average temperature with weighted temperature 1; iterations based on “weight_num” global parameter)
- OUTLIER_TABLE_RT5: Recency effect (step that replaces average temperature with weighted temperature 2; iterations based on “weight_num” global parameter)
- OUTLIER_TABLE_RT6: Recency effect (step that replaces average temperature with weighted temperature 3; iterations based on “weight_num” global parameter)
- OUTLIER_TABLE_RT7: Recency effect (step that replaces average temperature with weighted temperature 4; iterations based on “weight_num” global parameter)
- OUTLIER_TABLE_WEEKEND: Weekend effect
- OUTLIER_TABLE_WLS: WLS (weighted least squares)

Here are the columns in the table:

Table A6.6 Columns in OUTLIER_TABLE_* Tables

Column Name	Label
Holiday	Holiday Indicator
Weekday	Weekday
actual_load	Actual MW
ae	Absolute Error
ape	Absolute Percentage Error
datetime	Datetime
e	Error
outlier_flag	Outlier Flag
predicted_load	Predicted Load
t0_p1	Wthr Value
wd_orig	Original Weekday

See Also

[“Weight” on page 252](#)

PARAMETER_CONTROL Table

The PARAMETER_CONTROL table contains macro variables used by VSEL (value selection). These values are passed to STLF, VSTLF, and MTLF/LTLF programs.

Here are the columns in the table:

Table A6.7 Columns in PARAMETER_CONTROL Table

Column Name	Label
Best_Model	Best Model
FS	FS
MS	SM
MT	MT
SS	SS

Column Name	Label
TF	TF
TW	TW
WT	WT
airport	Airport Code
holiday_override	Holiday Override
mape	mape
num_cpu	Number of CPUs (Allocated to SAS Energy Forecasting)
rolling_end_date	rolling_end_date
rolling_start_date	rolling_start_date
single_temp_code	single_temp_code
sub_date_offset	sub_date_offset
sub_hour	sub_hour
train_start_date	train_start_date
utility	Utility
w_annual_mape	train_start_date
w_annual_peak_mape	w_annual_peak_mape
w_daily_mape	w_daily_mape
w_daily_peak_mape	w_daily_peak_mape
w_hourly_mape	w_hourly_mape
w_monthly_mape	w_monthly_mape
w_monthly_peak_mape	w_monthly_peak_mape
weight_lower	weight_lower
weight_num	weight_num
weight_upper	weight_upper
weighted_temp_code	weighted_temp_code

Column Name	Label
wls_weight	wls_weight

Very Short-Term Forecast Results

FCST_RESULTS Table

For information, see [“FCST_RESULTS Table” on page 272](#).

FCST_RESULTS_ALL Table

The FCST_RESULTS_ALL (see [“FCST_RESULTS_ALL Table” on page 273](#)) table contains forecast results for these models:

- GLM
- GLM two-stage (depends on if two-stage models are enabled and the best model from diagnose process)
- COMBINE (depends on if two-stage models are enabled and the best model from diagnose process)
- WLS (weighted least squares) model (only if “wls” parameter =yes)

FCST_STAT Table

The FCST_STAT table (see [“FCST_STAT Table” on page 272](#)) contains forecast statistics for these models:

- GLM
- GLM two-stage (if two-stage models are enabled and the best model from diagnose process)
- COMBINE (if two-stage models are enabled and the best model from diagnose process)
- WLS (weighted least squares) (only if wls parameter is **yes**)

OUTLIER_* Tables

The OUTLIER_* tables contain the percentage of all observations (based on the “outlier_percent” parameter) with largest forecast absolute error for various models.

Here are the tables:

- OUTLIER_GLM: The GLM model
- OUTLIER_GLM_W1: The WLS (weighted least squares) model 1
- OUTLIER_GLM_W2: The WLS (weighted least squares) model 2
- OUTLIER_GLM_W3: The WLS (weighted least squares) model 3

- OUTLIER_GLM_W4: The WLS (weighted least squares) model 4
- OUTLIER_GLM_WLS: The WLS (weighted least squares) model

Here are the columns in the table:

Table A6.8 Columns in OUTLIER_* Tables

Column Name	Label
actual_load	Actual MW
ae	Absolute Error
ape	Absolute Percentage Error
datetime	Datetime
e	Error
predicted_load	Predicted Load
special_day	Special Day Indicator
t0_p1	Wthr Value
wd_orig	Original Weekday
weekday	Weekday

Short-Term Forecast Results

FCST_RESULTS Table

For information, see [“FCST_RESULTS Table” on page 272](#).

FCST_RESULTS_ALL Table

The FCST_RESULTS_ALL (see [“FCST_RESULTS_ALL Table” on page 273](#)) table contains forecast results for these models:

- GLM
- GLM two-stage (if two-stage models are enabled and the best model from diagnose process) and/or:
- COMBINE (if two-stage models are enabled and the best model from diagnose process)

FCST_STAT Table

The FCST_STAT table (see “FCST_STAT Table” on page 272) contains forecast statistics for these models:

- GLM
- GLM two-stage models (depends on if two-stage models are enabled and the best model from diagnose process) and/or:
- COMBINE model (depends on if two-stage models are enabled and the best model from diagnose process)

Medium-Term/Long-Term Forecast Results

Point Forecast Results

FCST_RESULTS_ML_* and HIST_FCST_RESULTS_ML_* Tables

The FCST_RESULTS_ML_* tables contain the predicted load generated with various weather scenarios for various models for economic scenario 0.

The HIST_FCST_RESULTS_ML_* tables contain the predicted load generated with the actual weather scenario for various models for economic scenario 0.

Here are the forecast weather tables:

- FCST_RESULTS_ML_HOLIDAY_0: The holiday model
- FCST_RESULTS_ML_NAIVE_0: The naïve model
- FCST_RESULTS_ML_RECENCY_0: The recency model
- FCST_RESULTS_ML_WEEKEND_0: The weekend model

Here are the actual weather tables:

- HIST_FCST_RESULTS_ML_HOLIDAY_0: The holiday model
- HIST_FCST_RESULTS_ML_NAIVE_0: The naïve model
- HIST_FCST_RESULTS_ML_RECENCY_0: The recency model
- HIST_FCST_RESULTS_ML_WEEKEND_0: The weekend model

Here are the columns in the table:

Table A6.9 Columns in FCST_RESULTS_ML_* and HIST_FCST_RESULTS_ML_* Tables

Column Name	Label
Datetime	Datetime
Date	Date
Hour	Hour Ending

Column Name	Label
Actual_load	Actual MW
wthr_value	Wthr Value
Year	Year
Predicted_load	Predicted load

MNTHLY_STAT_ML_* and HIST_MNTHLY_STAT_ML_* Tables

The MNTHLY_STAT_ML_* tables contain the Min, Max, Mean, Median, Sum, Energy per Hour, and Monthly Load Factor for predicted loads generated with various weather scenarios for various models for economic scenario 0.

The HIST_MNTHLY_STAT_ML_* tables contain the same values for predicted loads generated with the actual weather scenario for various models of economic scenario 0.

Here are the forecast tables:

- MNTHLY_STAT_ML_HOLIDAY_0:
- MNTHLY_STAT_ML_NAIVE_0:
- MNTHLY_STAT_ML_RECENCY_0:
- MNTHLY_STAT_ML_WEEKEND_0:

Here are the actual statistics tables:

- HIST_MNTHLY_STAT_ML_HOLIDAY_0:
- HIST_MNTHLY_STAT_ML_NAIVE_0:
- HIST_MNTHLY_STAT_ML_RECENCY_0:
- HIST_MNTHLY_STAT_ML_WEEKEND_0:

Here are the columns in the table:

Table A6.10 Columns in MNTHLY_STAT_ML_* and HIST_MNTHLY_STAT_ML_* Tables

Column Name	Label
year	Year
month	Month
n	Number of Simulated Values
min	Min
mean	Mean
median	Median
max	Max

Column Name	Label
sum	Sum
energy_per_hour	Energy per Hour
monthly_load_factor	Monthly Load Factor

Probabilistic Forecast Results

ANNUAL_PEAK_STAT_NAIVE_* Tables

The ANNUAL_PEAK_STAT_NAIVE_* tables contain annual peak load statistics for a naïve model for various economic scenarios. The statistics are summarized based on temperature scenarios taken from a specified historical range.

Here are the tables:

- ANNUAL_PEAK_STAT_NAIVE_0: Economic scenario 0
- ANNUAL_PEAK_STAT_NAIVE_1: Economic scenario 1
- ANNUAL_PEAK_STAT_NAIVE_2: Economic scenario 2
- ANNUAL_PEAK_STAT_NAIVE_3: Economic scenario 3
- ANNUAL_PEAK_STAT_NAIVE_4: Economic scenario 4
- ANNUAL_PEAK_STAT_NAIVE_5: Economic scenario 5
- ANNUAL_PEAK_STAT_NAIVE_6: Economic scenario 6

Here are the columns in the table:

Table A6.11 Columns in ANNUAL_PEAK_STAT_NAIVE_* Tables

Column Name	Label
MAX	Max
Mean	Mean
Median	Median
Min	Min
Num	Number of Simulated Values
P10	P10
P90	P90
Year	Year
actual_peak	Actual Peak

FCST_RESULTS_ML_* and HIST_FCST_RESULTS_ML_* Tables

The FCST_RESULTS_ML_* tables contain the predicted load generated with various weather scenarios for various models for economic scenario 0.

The HIST_FCST_RESULTS_ML_* tables contain the predicted load generated with the actual weather scenario for various models for economic scenario 0.

Here are the forecast weather tables:

- FCST_RESULTS_ML_HOLIDAY_0: The holiday model
- FCST_RESULTS_ML_NAIVE_0: The naïve model
- FCST_RESULTS_ML_RECENCY_0: The recency model
- FCST_RESULTS_ML_WEEKEND_0: The weekend model

Here are the actual weather tables:

- HIST_FCST_RESULTS_ML_HOLIDAY_0: The holiday model
- HIST_FCST_RESULTS_ML_NAIVE_0: The naïve model
- HIST_FCST_RESULTS_ML_RECENCY_0: The recency model
- HIST_FCST_RESULTS_ML_WEEKEND_0: The weekend model

Here are the columns in the table:

Table A6.12 Columns in FCST_RESULTS_ML_* and HIST_FCST_RESULTS_ML_* Tables

Column Name	Label
Datetime	Datetime
Date	Date
Hour	Hour
Actual_load	Actual MW
Year_orig	Original Year
Year	Year
Predicted_load	Predicted load
mthyearmo	Month and Year

Backcast Results

BCST_RESULTS Table

The BCST_RESULTS table contains backcast results for a very short-term forecasting instance or a short-term forecasting instance.

Here the columns in the table for a very short-term forecasting instance:

Table A6.13 Columns in BCST_RESULTS Table for Very Short-Term Forecasting

Column Name	Label	Description
run_id_desc	Forecast Description	
run_id_nm	Run ID	Folder name of forecast instance (for example, 20150924_172744)
vstlf_best_results_dttm	Datetime	
vstlf_best_predicted_load_no	Predicted Load	
vstlf_best_act_load_no	Actual Load	
vstlf_best_load_no	Backcast Load	
vstlf_best_hourly_fcst_err_no	Forecast Error	$\frac{\text{Actual Load} - \text{Predicted Load}}{\text{Actual Load}}$
vstlf_best_hourly_model_err_no	Model Error	$\frac{\text{Actual Load} - \text{Backcast Load}}{\text{Actual Load}}$
vstlf_best_predicted_wthr_no	Predicted Temp	
vstlf_best_actual_wthr_no	Actual Temp	
vstlf_best_hr_no	Hour Ending	
vstlf_best_hourly_fcst_ape_no	Forecast APE	
vstlf_best_hourly_model_ape_no	Model APE	

Here are the columns in the table for a short-term forecasting instance:

Table A6.14 Columns in BCST_RESULTS Table for Short-Term Forecasting

Column Name	Label	Description
run_id_desc	Forecast Description	
stlf_best_results_dttm	Datetime	
run_id_nm	Run ID	Folder name of forecast instance (for example, 20150924_172744)
stlf_best_predicted_load_no	Predicted Load	
stlf_best_act_load_no	Actual Load	

Column Name	Label	Description
stlf_best_load_no	Backcast Load	
stlf_best_hourly_fcst_err_no	Forecast Error	$\frac{\text{Actual Load} - \text{Predicted Load}}{\text{Actual Load}}$
stlf_best_hourly_model_err_no	Model Error	$\frac{\text{Actual Load} - \text{Backcast Load}}{\text{Actual Load}}$
stlf_best_predicted_wthr_no	Predicted Temp	
stlf_best_actual_wthr_no	Actual Temp	
stlf_best_hr_no	Hour Ending	
stlf_best_hourly_fcst_ape_no	Forecast APE	
stlf_best_hourly_model_ape_no	Model APE	
stlf_best_lst24hrfcst_mape_no	Prev Forecast MAPE	
stlf_best_lst24hrmodl_mape_no	Prev Model MAPE	

See Also

Chapter 16, “Backcasting,” on page 87

Reconciliation Results

REC_HIER_RESULTS

Here are the columns in the table:

Table A6.15 Columns in REC_HIER_RESULTS Table

Column Name	Label
datetime	Datetime
2_util_loc_cd	Util Loc
PARENT_UTIL_LOC_CD	Parent Util Loc
date	Date
HE	Hour Ending
predict	Predicted Load

Column Name	Label
rec_load	Reconciled Load
rec_diff	Predicted Load minus Reconciled Load

This figure shows a sample REC_HIER_RESULTS table.

Figure A6.1 Sample REC_HIER_RESULTS Table

	Datetime	Util Loc	PARENT_UTIL	Date	Hour Ending	Predicted Load	Reconciled Load	Predicted Load minus Reconciled Load
1	04DEC15:01:00:00	MASS	NEISO	04DEC2015	01	5380.8307	5379.900836	0.9298235078
2	04DEC15:01:00:00	NEMASSBOST	MASS	04DEC2015	01	2386.5679	2386.567882	0
3	04DEC15:01:00:00	SEMMASS	MASS	04DEC2015	01	1344.3666	1344.366559	0
4	04DEC15:01:00:00	WCMMASS	MASS	04DEC2015	01	1648.9664	1648.966396	0
5	04DEC15:02:00:00	MASS	NEISO	04DEC2015	02	5168.0724	5153.329879	14.742523631
6	04DEC15:02:00:00	NEMASSBOST	MASS	04DEC2015	02	2285.9435	2285.943537	0
7	04DEC15:02:00:00	SEMMASS	MASS	04DEC2015	02	1281.5815	1281.581461	0
8	04DEC15:02:00:00	WCMMASS	MASS	04DEC2015	02	1585.8049	1585.804881	0
9	04DEC15:03:00:00	MASS	NEISO	04DEC2015	03	5042.5005	5021.758322	20.742208776
10	04DEC15:03:00:00	NEMASSBOST	MASS	04DEC2015	03	2234.6899	2234.689894	0
11	04DEC15:03:00:00	SEMMASS	MASS	04DEC2015	03	1242.8282	1242.828222	0
12	04DEC15:03:00:00	WCMMASS	MASS	04DEC2015	03	1544.2402	1544.240206	0
13	04DEC15:04:00:00	MASS	NEISO	04DEC2015	04	4998.9557	4977.5811	21.374646
14	04DEC15:04:00:00	NEMASSBOST	MASS	04DEC2015	04	2938.294586	2938.294586	0
15	04DEC15:04:00:00	SEMMASS	MASS	04DEC2015	04	2008.5427	2008.5427	0
16	04DEC15:04:00:00	WCMMASS	MASS	04DEC2015	04	1842.4585	1842.458461	0
89	04DEC15:23:00:00	MASS	NEISO	04DEC2015	23	2008.5427	2008.5427	0
90	04DEC15:23:00:00	NEMASSBOST	MASS	04DEC2015	23	6455.5202	6304.108553	151.41167476
91	04DEC15:23:00:00	SEMMASS	MASS	04DEC2015	23	1675.9791	1675.979108	0
92	04DEC15:23:00:00	WCMMASS	MASS	04DEC2015	23	1862.311	1862.311032	0
93	05DEC15:00:00:00	MASS	NEISO	04DEC2015	24	5930.9311	5800.285428	130.64569616
94	05DEC15:00:00:00	NEMASSBOST	MASS	04DEC2015	24	2581.1325	2581.132491	0
95	05DEC15:00:00:00	SEMMASS	MASS	04DEC2015	24	1502.5234	1502.523359	0
96	05DEC15:00:00:00	WCMMASS	MASS	04DEC2015	24	1716.6296	1716.629577	0

From the fact that the sample file contains so many zeros in the **Predicted Load minus Reconciled Load** column, you can determine that the sample file is for a bottom-up reconciliation. For every child node in a bottom-up reconciliation, the reconciled load is the same as the predicted load. That is, the difference between the reconciled load and the predicted load is zero.

REC_RESULTS

Here are the columns in the table:

Table A6.16 Columns in REC_RESULTS Table

Column Name	Label
date	Date

Column Name	Label
HE	Hour Ending
datetime	Datetime
zone1_load	Predicted Load zone1
zone1_rec_load	Reconciled Load zone1
zone2_load	Predicted Load zone2
zone2_rec_load	Reconciled Load zone2
zoneN_load	Predicted Load zoneN
zoneN_rec_load	Reconciled Load zoneN

This figure shows the REC_RESULTS file for [Table A6.16 on page 287](#).

	Date	Hour Ending	Datetime	Predicted Load NEMASSBOST	Reconciled Load NEMASSBOST	Predicted Load SEMASS	Reconciled Load SEMASS	Predicted Load WCMASS	Reconciled Load WCMASS
1	16OCT2015	16	16OCT15:16:00:00	2624.60246	2624.20416	1513.1108	1512.7125	1746.537	1746.139
2	16OCT2015	17	16OCT15:17:00:00	2647.12669	2647.32002	1546.2249	1546.4182	1776.52	1776.713
3	16OCT2015	18	16OCT15:18:00:00	2671.00847	2671.74514	1597.455	1598.1917	1822.311	1823.048
4	16OCT2015	19	16OCT15:19:00:00	2678.48573	2680.82368	1637.3852	1639.7232	1851.204	1853.542
5	16OCT2015	20	16OCT15:20:00:00	2697.77104	2702.45487	1667.9078	1672.5917	1877.536	1882.22
6	16OCT2015	21	16OCT15:21:00:00	2692.09228	2697.874	1664.3117	1670.0934	1869.947	1875.729
7	16OCT2015	22	16OCT15:22:00:00	2587.09048	2593.86127	1568.5568	1575.3276	1777.488	1784.258
8	16OCT2015	23	16OCT15:23:00:00	2399.27687	2408.45581	1406.3353	1415.5143	1630.617	1639.796
9	16OCT2015	24	17OCT15:00:00:00	2189.66287	2201.44417	1242.7903	1254.5716	1481.411	1493.192
10	17OCT2015	01	17OCT15:01:00:00	2019.43263	2033.86317	1121.8228	1136.2533	1371.017	1385.447
11	17OCT2015	02	17OCT15:02:00:00	1916.51782	1932.76273	1056.6314	1072.8763	1308.698	1324.942
12	17OCT2015	03	17OCT15:03:00:00	1863.80432	1881.12783	1025.6672	1042.9907	1277.917	1295.241
13	17OCT2015	04	17OCT15:04:00:00	1849.00604	1867.31251	1019.5259	1037.8324	1268.891	1287.197
14	17OCT2015	05	17OCT15:05:00:00	1881.11926	1900.32912	1045.3429	1064.5528	1297.512	1316.722
15	17OCT2015	06	17OCT15:06:00:00	1994.67031	2014.66094	1125.1904	1145.181	1395.067	1415.058
16	17OCT2015	07	17OCT15:07:00:00	2233.93198	2252.20361	1280.2999	1298.5716	1583.75	1602.021

You can see that it shows both the **Predicted Load** and the **Reconciled Load** for each of the three children zones in the hierarchy.

LVL2RECFOR

This table is a summary of the parent zone for a bottom-up reconciliation.

Here are the columns in the table:

Column Name	Label
Level2	Level2
date	Date

Column Name	Label
HE	Hour Ending
datetime	Datetime
load	Predicted Load
rec_load	Reconciled Load
rec_diff	Difference Predicted Load vs. Reconciled

LVL3RECFOR

This table is a summary of the parent zone for a top-down reconciliation.

Column Label Level2 Level2 Level3 Level3 date Date HE Hour Ending datetime
 Datetime load Predicted Load rec_load Reconciled Load rec_diff Difference Predicted
 Load vs. Reconciled

Here are the columns in the table:

Column Name	Label
Level2	Level2
Level3	Level3
date	Date
HE	Hour Ending
datetime	Datetime
load	Predicted Load
rec_load	Reconciled Load
rec_diff	Difference Predicted Load vs. Reconciled

