# Forecast

## Load and Generation Forecasting

## Configuration Guide

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# Chapter 1 What is Forecast?

Welcome to the Open Systems International, Inc. (OSI) **Forecast™** product. **Forecast** is a tool that enables you to create accurate load and renewable generation forecasts for periods from 1 day to 35 days. **Forecast** uses the historical archive of area load, renewable generation and weather data and a variety of user-selectable algorithms to effectively forecast the load demand and renewable generation.

**Forecast** lets you compare generated forecasts with actual load histories and allows adjustments of load values to increase the accuracy of the forecasts. You can adjust load values by making direct changes to the base forecast or by using reshaping tools provided by the product. **Forecast** also includes tools for accepting and saving the forecast and a load-graphing panel; all of which add additional flexibility to enable you to use this software tool effectively.

**Forecast** enables you to:

- View, analyze and edit historical data
- Get real-time weather and load parameters from SCADA and receive alarms if actual load deviates from the forecast significantly
- Create load forecasts from 1 day for up to 35 days in length
- Create multiple study load forecasts so you can designate the best forecast to run as an automatic forecast
- Perform a range of comparative forecasting operations to analyze system load and to gain insight into the dynamic behavior of the load and its correlations to weather and other parameters
- View the forecasts in both tabular and graphical format
- Set up forecasts that automatically run periodically
- Prepare operational plans from the forecasts that other applications or departments within your organization can use
- Similar to load forecast, support creation of renewable generation forecast for wind and solar resources

## 1.1 Load Forecast Philosophy

### 1.1.1 Factors Affecting Load Forecasting

Load is a dynamic entity affected by two main factors:

- Time of day (also known as weather-independent factor or patterns of daily life)
- Weather-dependent factors, such as temperature, wind, light intensity and humidity

The time dependence of the load reflects the existence of a daily load pattern, which can vary for different days, such as weekdays, weekends or holidays. This daily load pattern represents the normal pattern of daily life.

Apart from the day and time, load is also dependent on seasons. Load will be moderate in fall and spring, whereas it may be higher in winter and rise to the peak in summer. Temperature is the primary weather factor that affects load. Humidity (in the summer) and wind speed (in the winter) also influence energy consumption. **Forecast** accounts for all of these factors and allows you to include different weather-related factors in the forecast, such as cloud cover/light intensity and dew point.

### 1.1.2 Factors Affecting Renewable Generation Forecasting

Renewable generation is a dynamic entity affected by two main factors:

- Installed capacity of renewable generation at a site (This is weather-independent variable)
- Weather-dependent factors, such as wind speed, solar irradiance, temperature and air density

Apart from the installed capacity that would define maximum renewable generation from site, renewable generation is also highly dependent on weather conditions. Renewable generation from wind resources is highly dependent on wind speed, wind direction and air density. Renewable generation from solar resources is highly dependent on solar irradiance and solar panel surface temperature. **Forecast** accounts for all of these factors and allows you to include different weather-related factors in the forecast, such as cloud cover/light intensity and dew point.

### 1.1.3 Forecasting Methodology

Several methodologies for forecasting load and renewable generation have been developed in the industry over the past few years. **Forecast** supports the Regression and Neural Network methods.

#### Regression Method

The Regression method uses statistical methods to find correlations between load/renewable generation and various parameters that affect load/renewable generation. Using the historical load/renewable generation and weather data, this methodology attempts to calculate a load model and renewable generation model using the regression analysis theory. This method is fairly simple and does not require any adjustments or creation of manual load profiles. You have control over the model used to find the correlations between (1) load and independent parameters and (2) renewable generation, capacity and independent parameters.

#### Neural Network Method

The Neural Network method is a more advanced methodology that uses a basic pattern recognition model to forecast loads and renewable generations. It is based on a Neural Network concept of "learn from the past" to "forecast the future." You must train the neural network model periodically to get a more accurate result.

Refer to the *Forecast Design Description* for more details on the forecast methodologies.

Additionally, **Forecast** supports importing externally generated forecast. The imported forecast can be used for comparative accuracy analysis with internally generated forecast. Imported forecasts can also be used as planned forecasts.

# Chapter 2 Getting Started with Forecast

## 2.1 Installing Forecast

**Forecast** is installed using **Web Platform** installer. If no special configuration is needed, using the installer as normal is sufficient to install **Forecast**.

NOTE

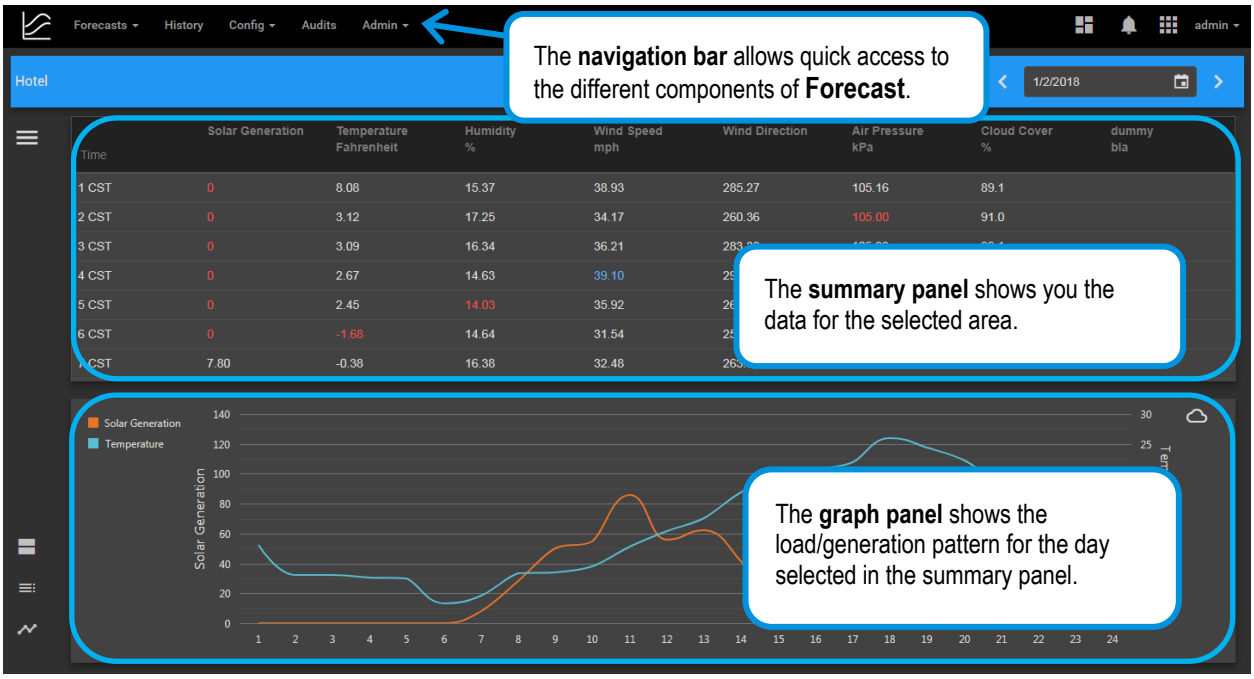
If the default port of 27013 for **Forecast**'s mongo database instance is not desired, you will need to unzip the **Forecast** zip file, edit the mongo.forecast.jrc.default file to include with the desired port and rezip before running the **Web Platform** installation builder.

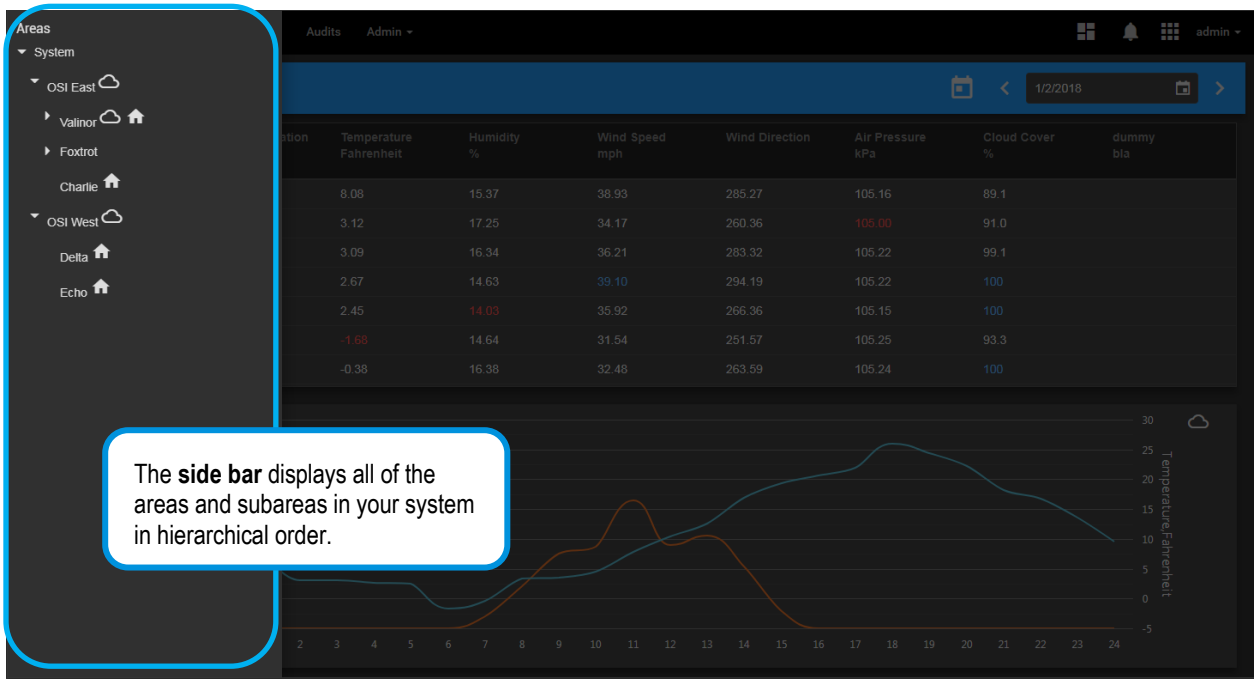
## 2.2 Starting Forecast

1. To start the application, open a web browser and navigate to your web application server.
2. Enter your username and password and click **Login** (or press <Enter>).


3. The OSI Web Applications home page will open. Click the **Forecast** icon.


## 2.3 Understanding the Layout of Forecast






**NOTE**

The data you see depends on what permissions your user has.

**NOTE**

Areas that are grayed out do not support the type of data you are trying to view.

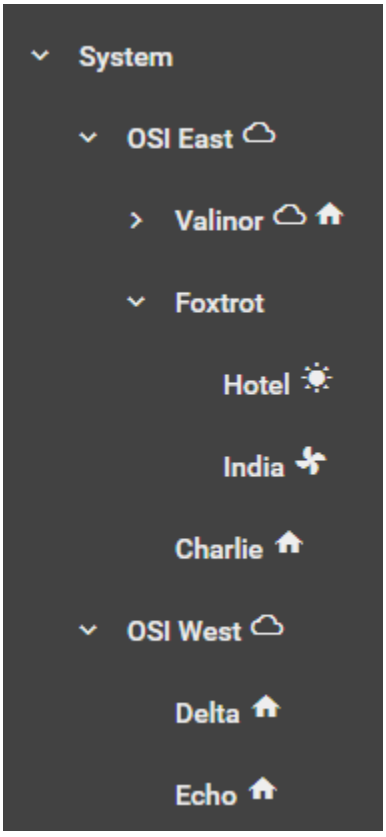
# Chapter 3 Areas

## 3.1 Introduction

An area is a geographical or business organization category to logically group forecasts. **Forecast** uses a hierarchical approach to defining areas. Each area has at most one super area and many subareas. Areas can be configured to be a load, wind or solar area. The super area load, wind generation or solar generation is the sum of the values for each of its subareas.

Weather data must be stored in a super area. The subareas will inherit the weather data from their super area. This means if areas are in the same geographical region you do not have to duplicate weather data. You can configure forecasts for any area that has a super area where weather data is stored. There is no limit to the number of areas you can create. There is also no limit on which areas may store weather data.

**NOTE** A cloud icon next to the area name indicates it is configured to store weather data.




The load value that you see when you select a main area is the sum of the loads of the subareas under it. The System area load value is the sum of all the main area load values.

## 3.2 Area Definitions Example

A customer mainly operates at the distribution level in some state so they define a hierarchy for their data as System → Region → County → City → Substation. As weather within a city does not vary enough significantly, they store historical weather data at the City level. They store their historical load at the Substation level, keeping track of the load going through each substation. They can then set up forecasts at either the City level or the Substation level.

## 3.3 Defining the System Hierarchy

1. From the navigation bar, select **Admin → Hierarchy**.
2. Click the button with the padlock image to allow you to change the data in the hierarchy.
3. Select the area from the list you want to add a subarea to. If you want to add a new main area, select System.
4. Click the plus button.
5. Enter a descriptive name for the area.
6. If desired, enter minimum and maximum load values. If loads go outside of these values, coloring rules will be applied to values outside of this range.
7. Define the latitude and longitude location of the area.


NOTE

The latitude and longitude for an area are used to calculate the expected solar irradiance value in solar generation forecasting.

8. Set what type of data will be stored in the area (None, Load, Wind or Solar).


NOTE

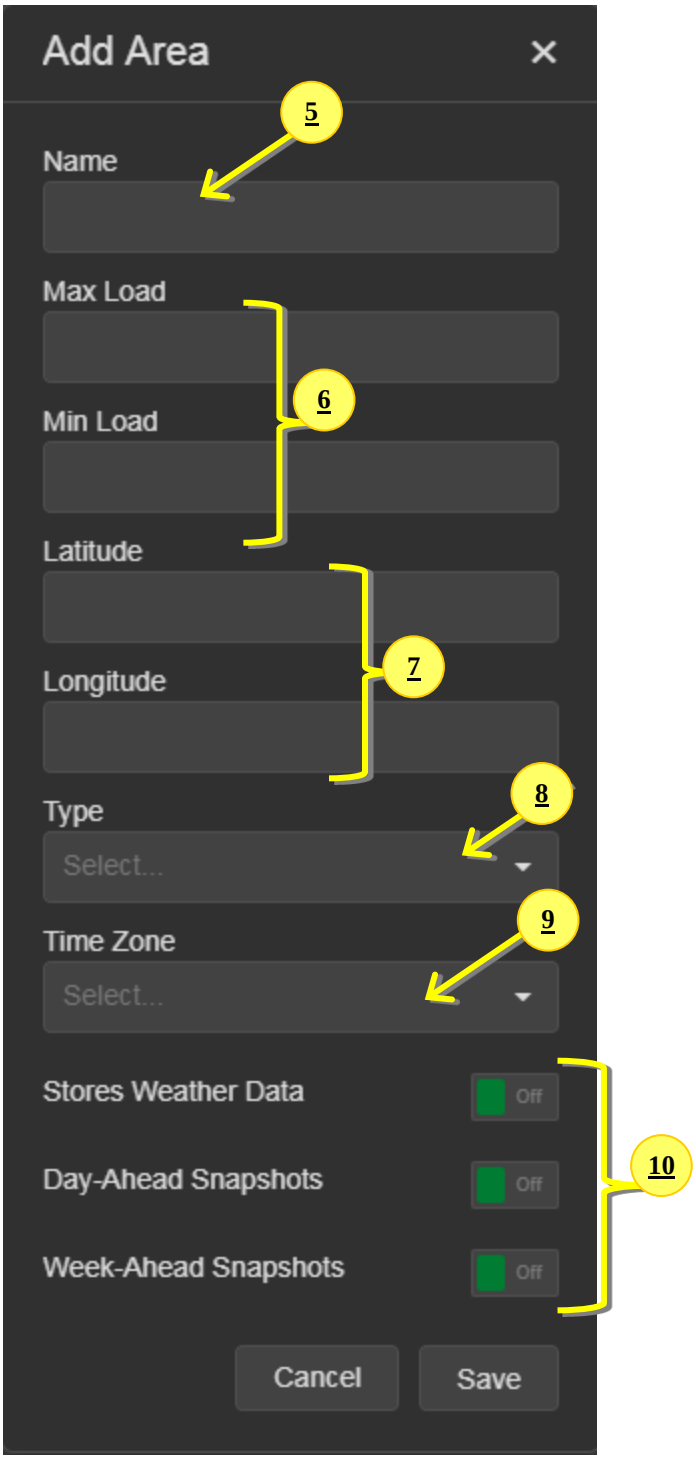
For an area that is composed of small scale solar generation like rooftop solar, model it as Load area. Each of those small scale solar units are modeled as devices in Solar Panel device configuration.

9. Select the time zone that this area exists in. This can be different for each area type and forecasts will run at the time associated with the time zone of the area it is created in.


NOTE

If no time zones are defined for an area, the first super area with a time zone defined will be used. If this is not defined for any areas in a branch, the system time zone will be used.

10. Use the flags at the bottom to determine if this area should store weather data and whether it is included when performing snapshots. See Section 3.4 for more information on snapshots.

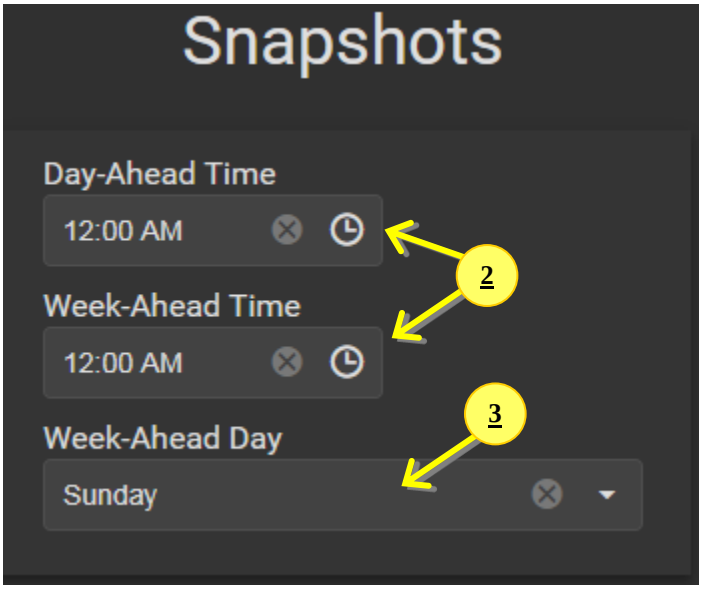



## 3.4 Configuring Snapshots

You can configure the system so that areas with accepted forecast plans have their values saved off at defined times. This keeps that data separate from the continuously updating load plan values and allows you to see what the forecast values and accuracy percentages were at the start of the day or week.

To configure the times that snapshot data is saved:

1. From the navigation bar, select **Admin → Snapshots**.
2. Click the clock icon next to the **Day-Ahead Time** and/or **Week-Ahead Time** fields to select the time you want the daily or weekly data to be saved off (or "snapped"). If left blank, they default to midnight.
3. If using the Week-Ahead snapshot, set **Week-Ahead Day** to the day of the week you want the weekly data snapshot to occur.



# Chapter 4 Load Forecasting Factors

## 4.1 Understanding Factors that Affect Load Forecasting

Load is a dynamic entity affected by two main factors:

- Time of day (also known as weather-independent factor or patterns of daily life)
- Weather-dependent factors, such as temperature, wind, light intensity and humidity

The time dependence of the load reflects the existence of a daily load pattern, which can vary for different days, such as weekdays, weekends or holidays. This daily load pattern represents the normal pattern of daily life.

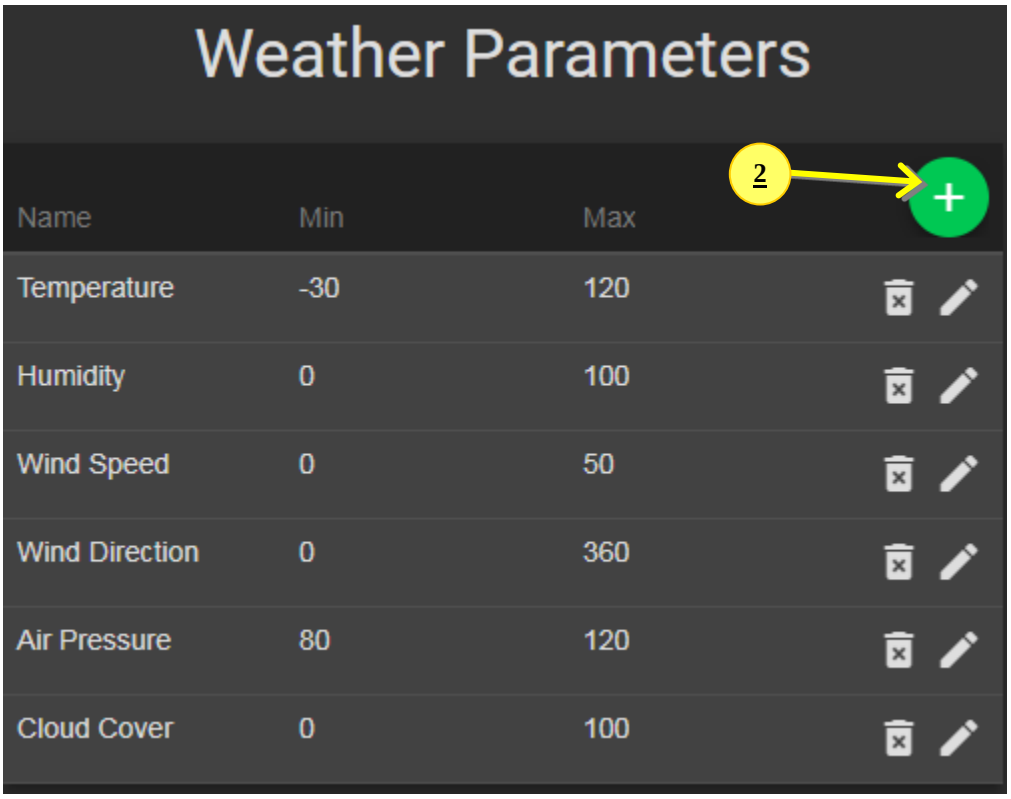
Apart from the day and time, load is also dependent on seasons. Load will be moderate in fall and spring, whereas it may be higher in winter and rise to the peak in summer. Temperature is the primary weather factor that affects load. Humidity (in the summer) and wind speed (in the winter) also influence energy consumption. **Forecast** accounts for all of these factors and allows you to include different weather-related factors in the forecast.

**NOTE**

Due to the dependence of load on temperature, OSI recommends that **Forecast** is configured to minimally include temperature parameter.

## 4.2 Configuring Weather Parameters

1. From the navigation bar, select **Admin → Weather Parameters**.
2. Click the plus icon to add a weather parameter.




**3.** Enter a descriptive name for the parameter you are adding.

**4.** Set **Type** to **Cloud Cover**, **Solar Irradiance**, **Angle** or **Custom**. This tells **Forecast** what type of data the weather parameter is and adjusts its forecasting accordingly. If this behavior is not wanted, you can use the Custom type to disable the feature.

**5.** Enter the units of measurement this parameter uses.

**6.** Enter the number of places you want to appear after the decimal point.

**7.** Provide the minimum and maximum values for this parameter. **Forecast** will reject any values that are outside of this range.

**8.** Use the Weight field to determine how important this parameter is in finding a matching weather date. The higher the number in comparison to the other weather parameters, the more important it is.

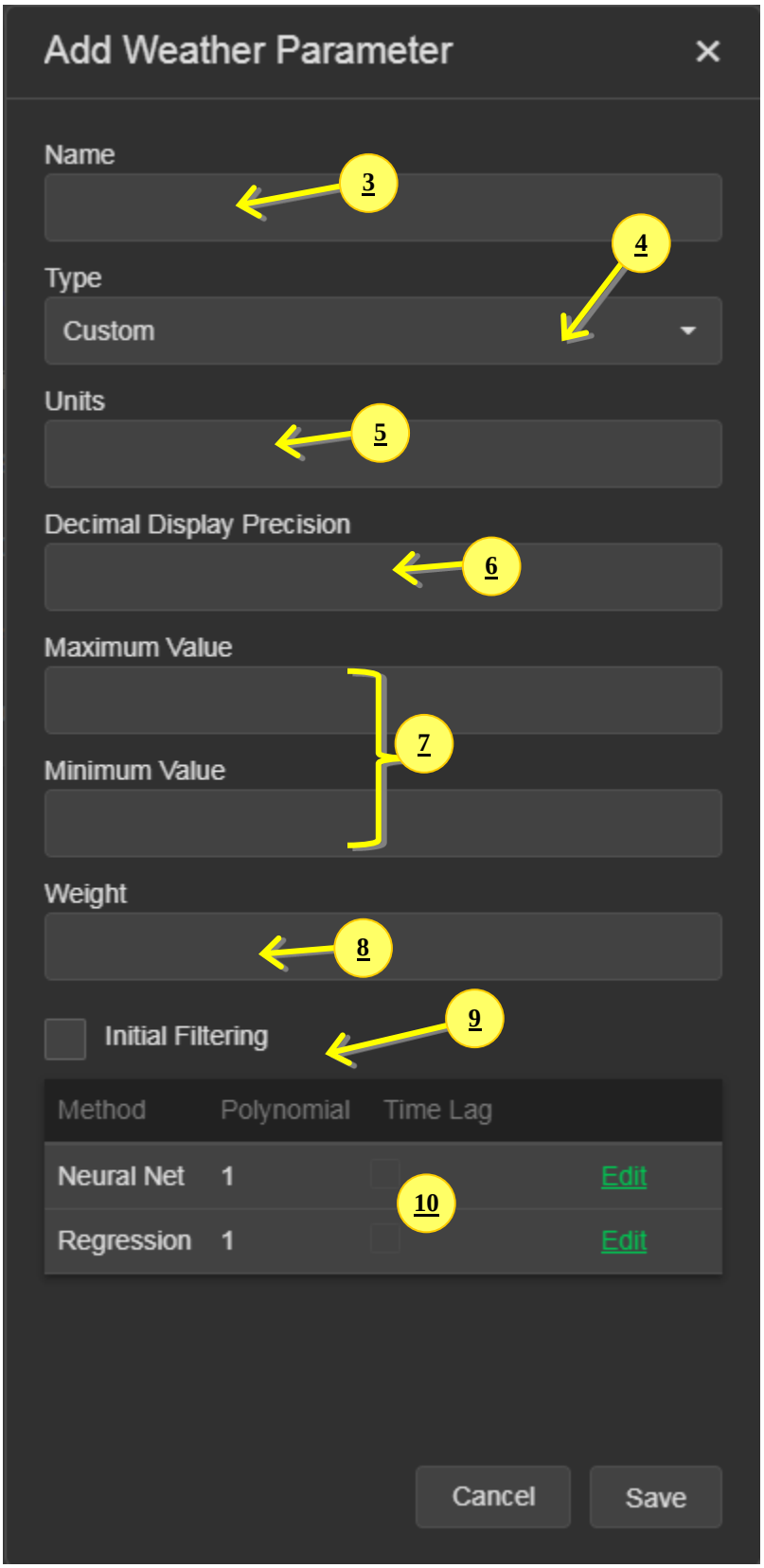
**9.** Regression forecasts attempt to remove bad historical data. If **Initial Filtering** is checked, **Forecast** will filter out data if the maximum and minimum values for the historical day are outside a band around the maximum and minimums for the forecasted day for this weather parameter.

**10.** In the bottom section of the dialog you can define default polynomial order to use in the forecasting algorithms for this parameter. Configure the default model to use for each of the algorithms by specifying the polynomial degree and whether to add a series of weather value deltas for each weather parameter.

**TIP** For the Neural Net algorithm, OSI recommends setting the polynomial degree to 1 for all weather parameters.

**TIP**

If using temperature, OSI recommends setting up the temperature weather parameter with a polynomial degree of 3 and using time lagged deltas as part of the load model. If this proves to give inaccurate results, update the model accordingly.


Add Weather Parameter
Name
3
Type
4
Custom
Units
5
Decimal Display Precision
6
Maximum Value
7
Minimum Value
Weight
8
Initial Filtering
9
Method
Polynomial
Time Lag
Neural Net
1
Edit
10
Regression
1
Edit
Cancel
Save

NOTE

These values can be overridden when creating a forecast.

## 4.3 Configuring Special Days

There may be days where load is expected to be different, such as holidays in which businesses may be closed. You can accommodate this by defining special days in the system.

NOTE

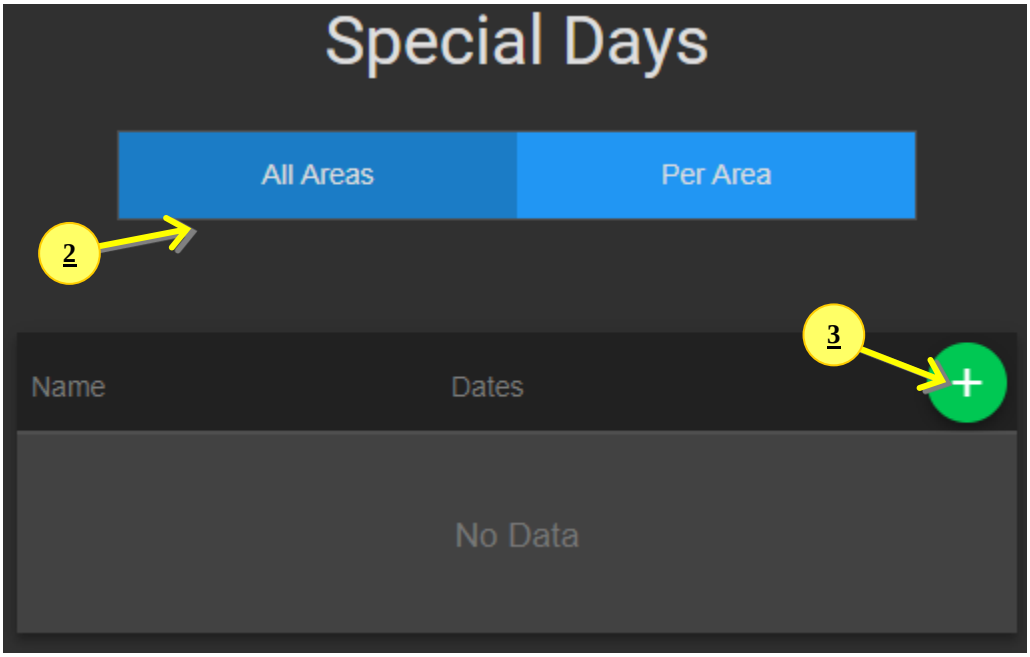
Other irregular situations, such as construction or worker strikes, are considered anomalies. See Section 5.1 for more details.

1. From the navigation bar, select **Admin → Special Days.**
2. Select either **All Areas**, or **Per Area** (and then specify the area you want the special day to apply to).

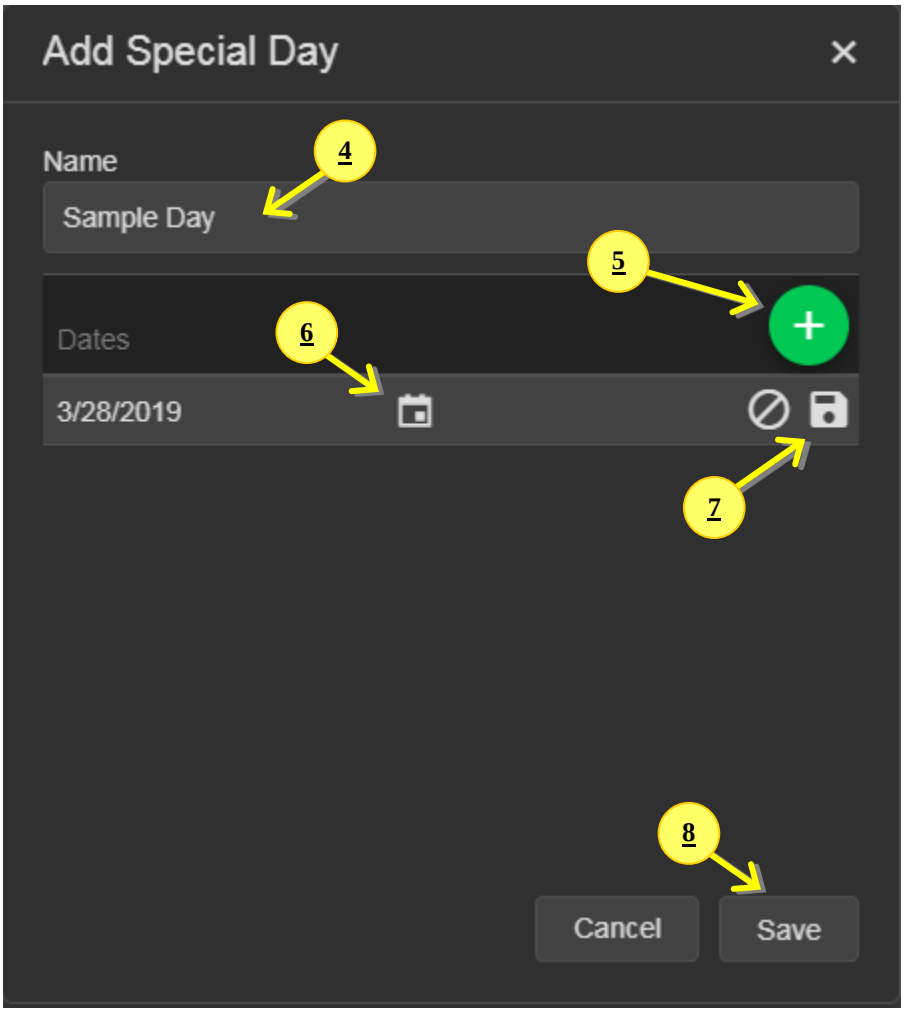
NOTE

Special days adhere to the hierarchical format of areas. If you configure a special day for an area, all of its subareas will inherit it.

3. Click the plus button.




4. Enter a descriptive name for the day.
5. In the Dates section, click the plus button.
6. Select the desired date using the date picker.
7. Click the save icon (shaped like a floppy disk).
8. To save your changes, click **Save**.




## 4.4 Configuring Seasons

You can configure the months to fall into specific seasons. You can then apply low and high cut off values for each weather parameters that are specific to that season.

### 4.4.1 Defining Seasons

NOTE

All the months have to be used and must be used only once.

1. From the navigation bar, select **Admin → Seasons**
2. Click and drag each month to the corresponding season.
3. To create a new season, click and drag a month to the right side of the list of seasons.
4. Click on the green save button in the upper right corner to save your changes.

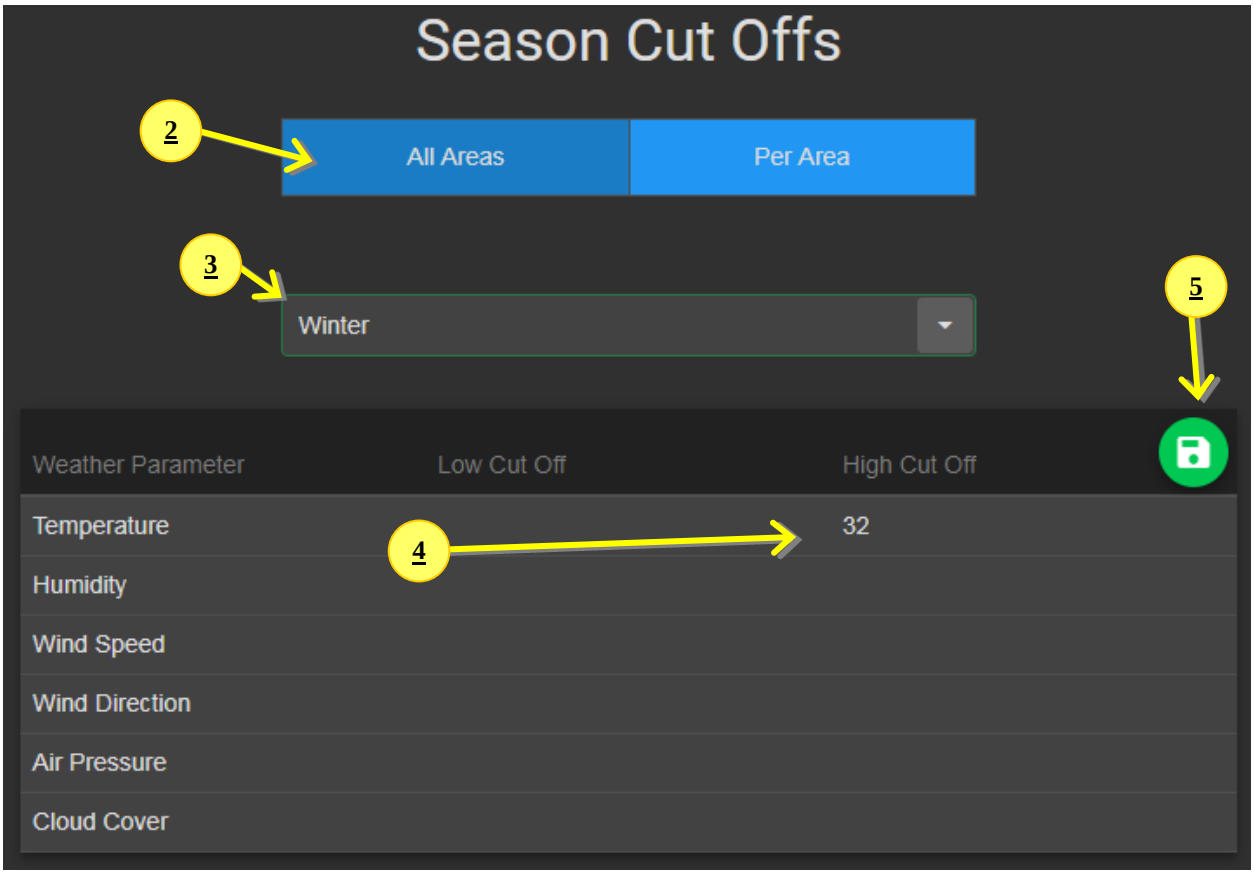

### 4.4.2 Defining Season Cut Offs

To add a season:

1. From the navigation bar, select **Admin → Season Cut Offs**
2. Select either **All Areas**, or **Per Area** (and then specify the area you want the special day to apply to).
3. Select a season from the drop-down.
4. Enter cut-off values for each weather parameter as desired. At these values, weather stops affecting load.

   For example, if the low cut off value for temperature is 30, if the temperature drops below 30, the algorithm will treat the value as 30. Likewise if the high cut off is 120 and the temperature goes above that, the algorithm will treat the value as 120.

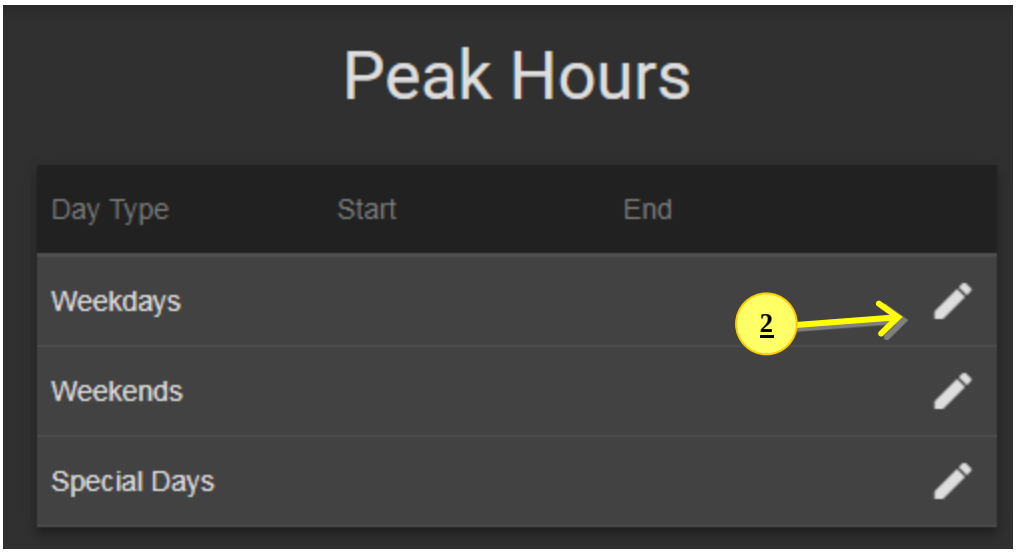
   You may leave fields empty.
5. Click on the green save icon to save your changes.




## 4.5 Configuring Peak Hours

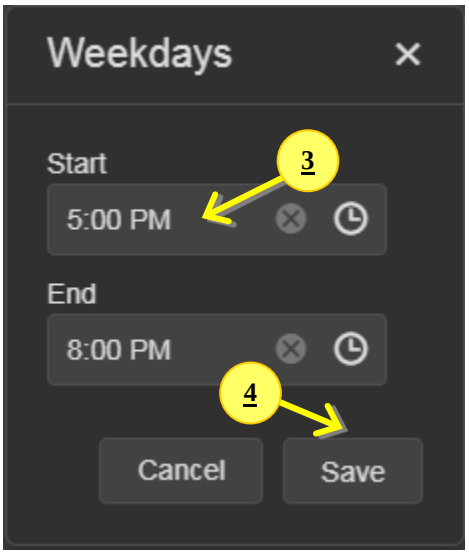
The different day types may have certain hours where the load is expected to be higher. You can set start and end times each day type (weekend, weekday and special day) to determine when **Forecast** looks for the peak load.

1. From the navigation bar, select **Admin → Peak Hours**.
2. Click the pencil icon next to the day type you want to set peak hours for.

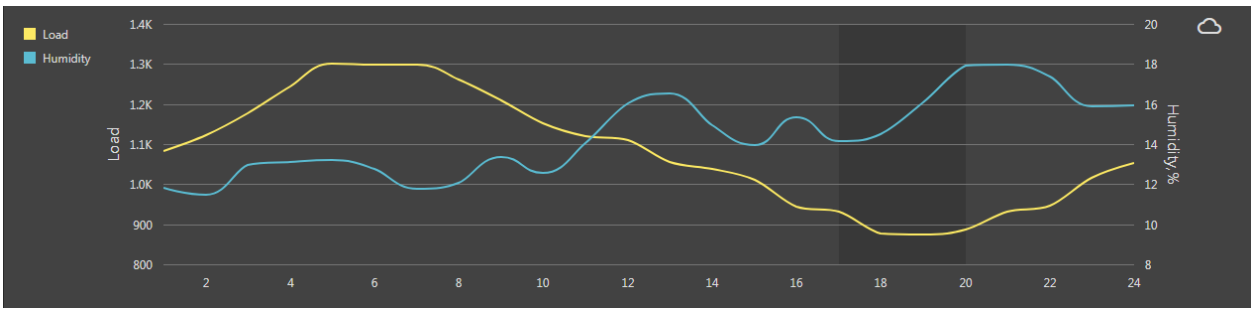



**3.** Click the clock icon in the Start and End fields to set the time period for peak load.

**4.** Click **Save**.




The time defined as the peak hours will be shaded darker in the graph view than the other hours.

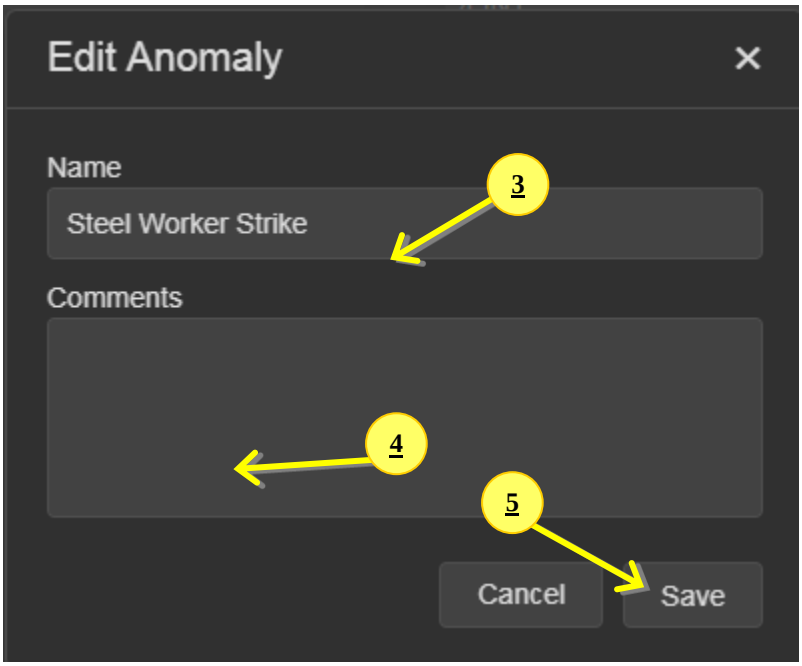


# Chapter 5 Anomalies and Real-Time Data Import

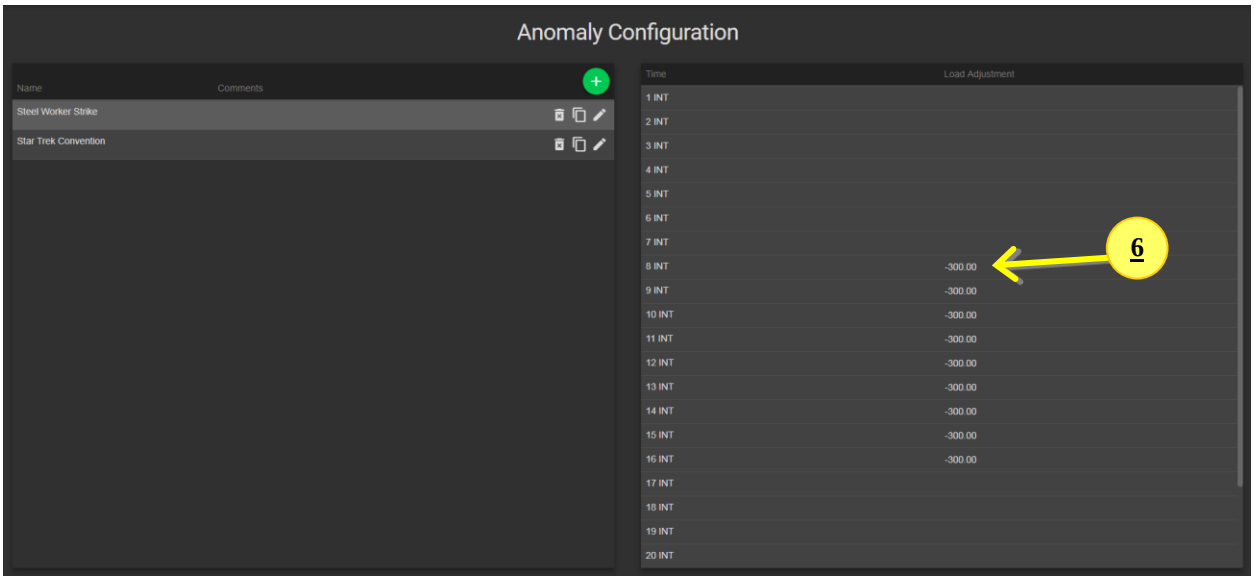
## 5.1 Configuring an Anomaly

An anomaly is a non-conforming load that appears occasionally and changes (increases or decreases) the usual load demand abruptly. For example, if a special event occurs, such as a steel mill shutdown, or an abnormal event, such as a convention, load will increase or decrease drastically. For this reason, **Forecast** enables you to configure different anomaly schedules that operators can apply to a forecast.

1. From the navigation bar, select **Admin → Anomaly Configuration**.
2. Click the plus icon in the left panel.
3. Enter a descriptive name for the anomaly so that other users will be able to tell what it applies to.
4. Enter any additional comments as needed.
5. Click **Save**.




6. Select the anomaly you just created from the left panel. In the right panel, click in the **Load Adjustment** field for an hour to enter the amount that the forecast should be adjusted by during that hour.

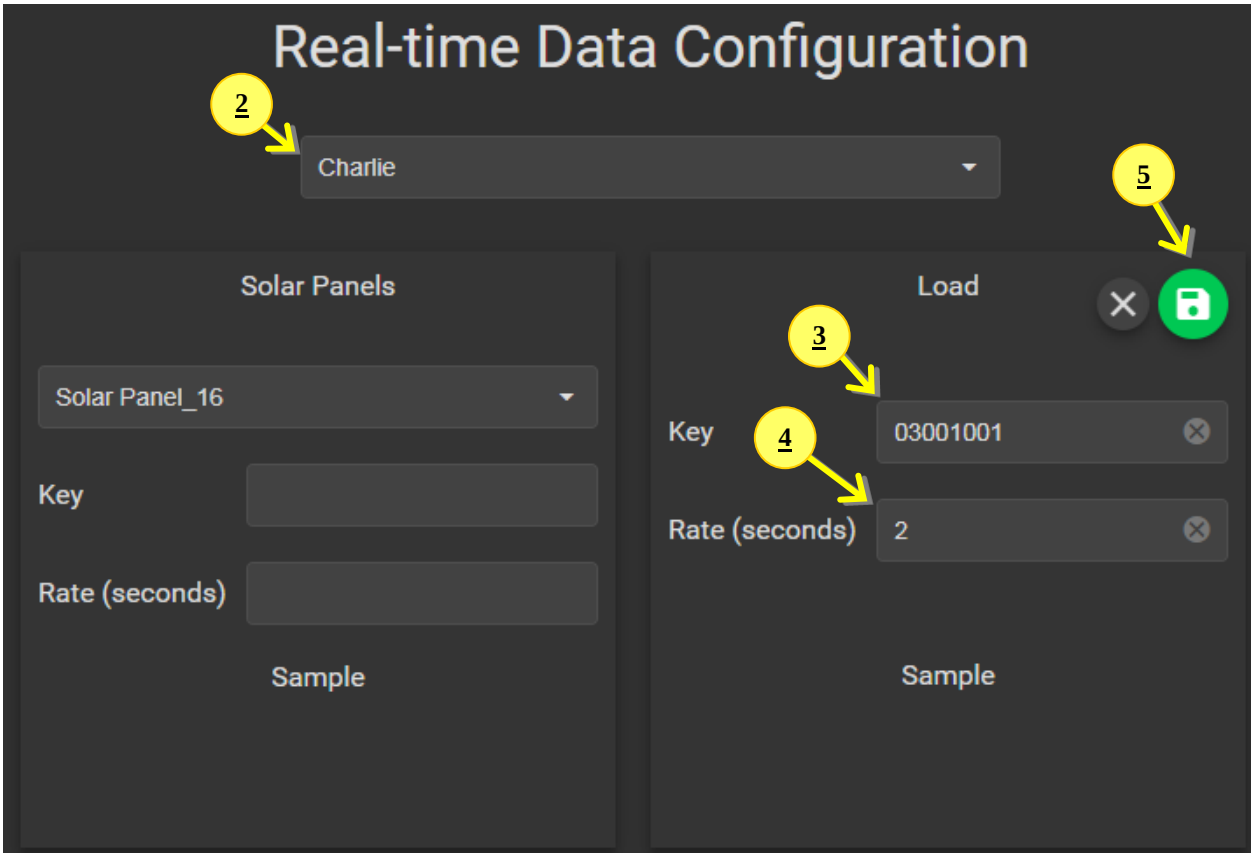



To edit the name or comments for an existing anomaly, select it from the list and click the pencil icon. To copy an anomaly, click the paper icon. To remove an anomaly, click the trash can icon.


## 5.2 Configuring Real-Time Data Import

You can take real-time data from your SCADA database and store in the **Forecast** database for later use.

1. From the navigation bar, select **Admin → Real-time Data Configuration**.
2. Select an area from the dropdown. You will see each value that can be stored in that area.
3. In the **Key** field, enter the SCADA key that contains the data for the chosen parameter.
4. In the **Rate (Seconds)** field, enter how often you want **Forecast** to sample data from the SCADA key.
5. Click **Save**.



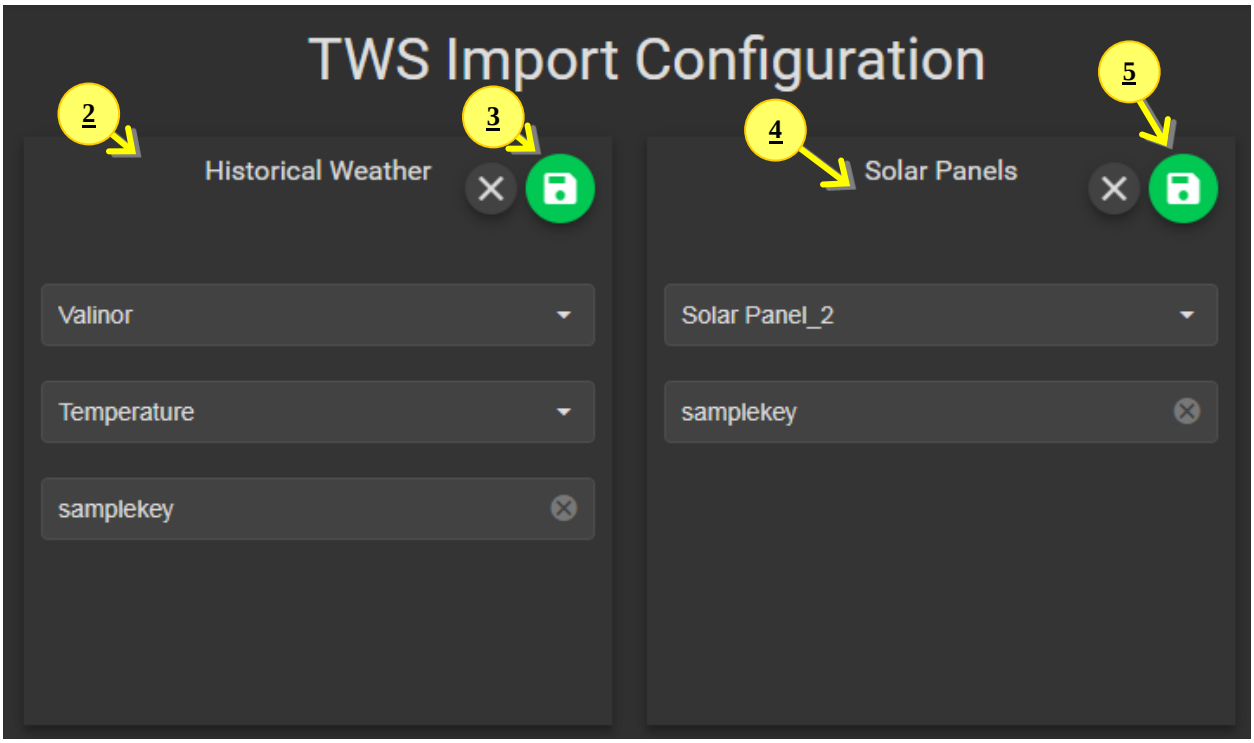

NOTE

The Sample field shows the value for the SCADA key during the last check as well as the time it was last checked.

## 5.3 Configuring TWS Data Import

You can periodically poll TWS data and store it in the **Forecast** database for later use.

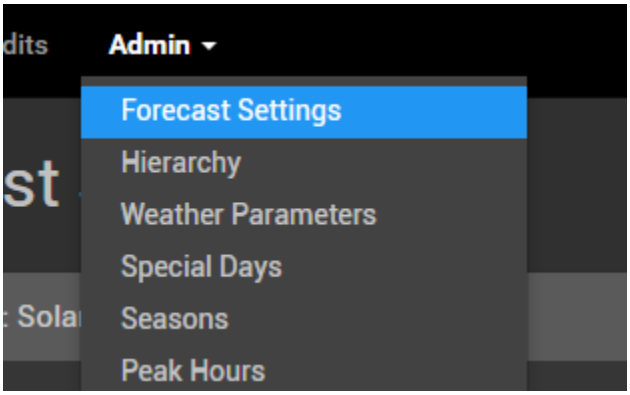
1. From the navigation bar, select **Admin → TWS Import Configuration**.
2. In the Historical Weather panel, select an area, select a weather parameter and specify a TWS key.
3. Click on the green save icon to save changes.
4. In the Solar Panels panel, select a panel and specify a TWS key.
5. Click on the green save icon to save changes.




**NOTE** The Sample field shows the value for the SCADA key during the last check as well as the time it was last checked.

# Chapter 6 Default System Settings

**Forecast** has some general settings for which you can configure default values. To get to these settings, select **Admin → Forecast Settings** from the navigation bar.

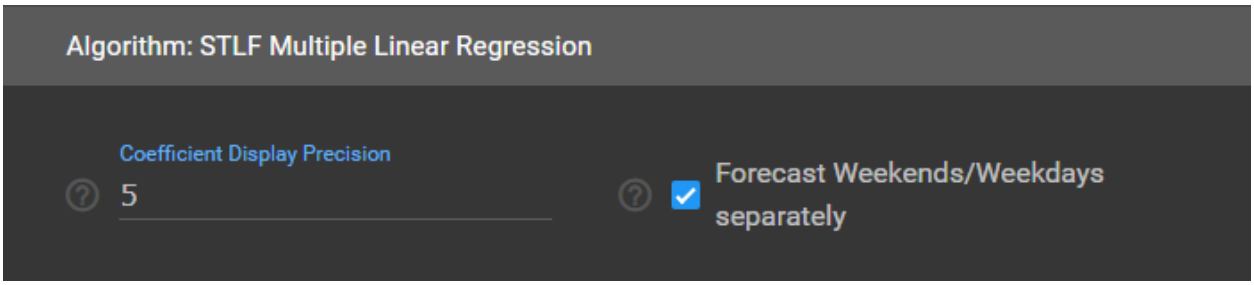



Anytime you make changes to these system settings, they apply immediately. You do not need to restart or log out/log back in.

## 6.1 Algorithm Settings

In the Algorithm section, you can define certain behaviors for both the Regression and Neural Network methods.

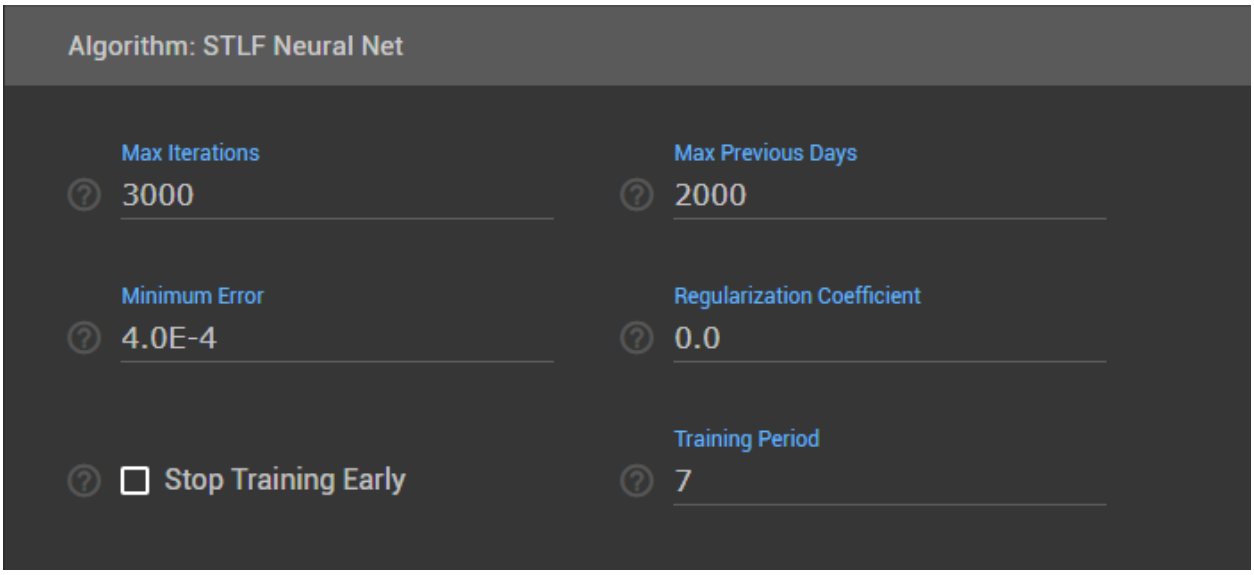
### 6.1.1 Regression




| Field | Description |
|---|---|
| Coefficient Display Precision | The precision for displaying coefficients of linear regressions. |
| Forecast Weekends/Weekdays separately | Check this box if you want **Forecast** to differentiate between weekend and weekday data and have separate forecast models for both, instead of just pulling an entire week's worth of data. Checking this box may increase the accuracy of your forecasts. |

### 6.1.2 Neural Network

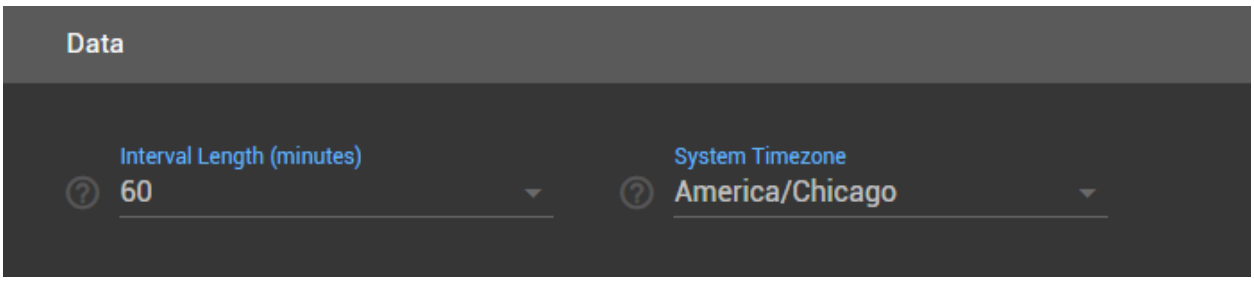
In the Neural Net section, the parameters either alter the structure of the network model used or determine how to train the models. Training a Neural Net is a careful balance between teaching the Neural Net the relationships between the inputs and outputs and preventing the Neural Net from *overfitting*, or becoming too biased toward the training data. The configuration options, such as Regularization and Stop Training Early, are available to help prevent overfitting during training. Other options, like Max Iterations and Minimum Error, are meant to give the Neural Net enough time to train on.




| Field | Description | Allowed Values | Default Value |
|---|---|---|---|
| Max Iterations | The maximum number of iterations allowed during the training of a Neural Net model. Increase this if you want your Neural Nets to have more training. | Positive integer | 3000 |
| Max Previous Days | The maximum number of days that historical data will be brought in when training a neural network | Positive integer | 2000 |
| Minimum Error | The target error during training. If while training, Forecast detects that the model has obtained an error smaller than the configured value, training will stop for that model. | Positive decimal number | 0.0004 or 0.04% |
| Night Zenith Angle (Degrees) | The sun position, in number of degrees off of directly above, at which solar generation clamping activates. | Decimal number between 0-180 | 90.388 |
| Regularization Coefficient | Adds a penalty factor to high magnitude weights. Increasing this value will reduce the bias during training toward the training data. If you find the Neural Net algorithm is doing well on historical data, but not on future data, increasing this and retraining may help. | Positive decimal number | 0 |

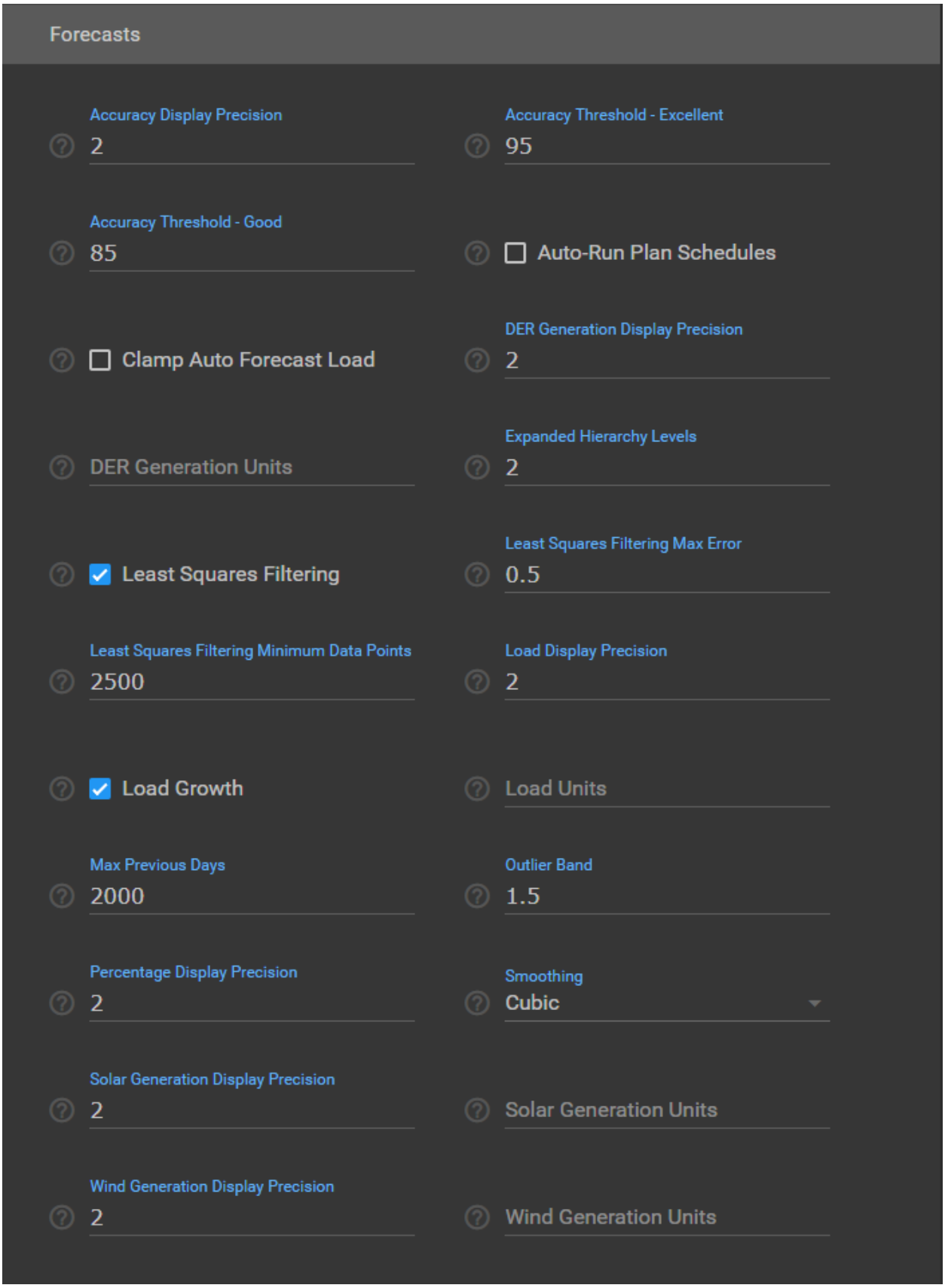
| Field | Description | Allowed Values | Default Value |
|---|---|---|---|
| Should Clamp Solar Generation (Solar Only) | Enable solar generation clamping. When enabled, if the sun zenith angle is greater than the specified Night Zenith Angle, then solar generation is clamped to the specified Solar Generation Clamp Value. | Checked/unchecked | Checked |
| Solar Generation Clamp Value | When solar generation clamping activates, the number of MW that solar generation is clamped at. | Positive decimal number | 0.0 |
| Training Period | How often, in days, Forecast should retrain NN models set to Auto | Positive integer | 7 |
| Value of K (Number of Folds) | The number of sets in which the training data set is split. | Positive Integer | 10 |
| Training Method | Method used in training the neural network | Default, Early Stop, K-Fold Cross Validation | Default |

## 6.2 Default Forecast Interval and Time Zone Settings




| Field | Description | Allowed Values | Default Value |
|---|---|---|---|
| Interval Length (minutes) | Select how many minutes are between data entries for a load forecast | 5, 15, 30, 60 | 60 |
| System Timezone | Select the time zone that should be used by default if an area does not have one specified | Any valid time zone | Server system time zone |

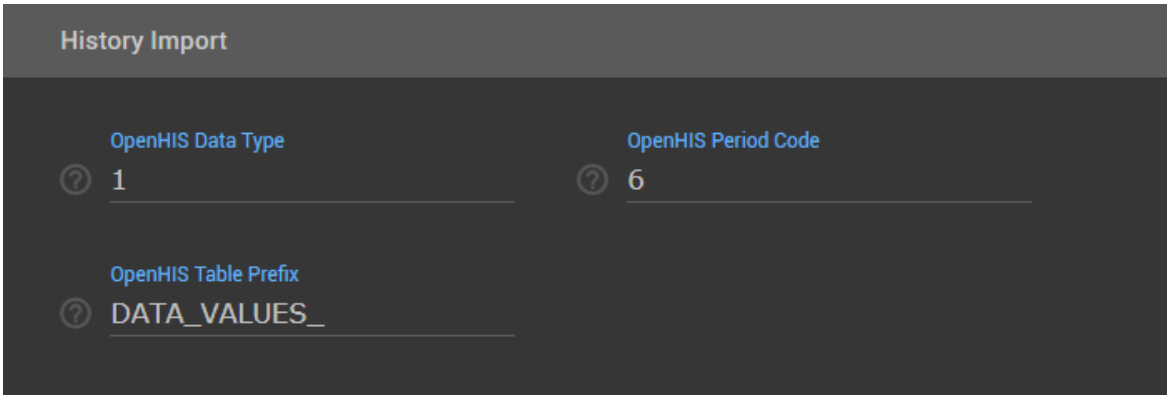
## 6.3 Forecast Properties


Forecasts
Accuracy Display Precision
2
Accuracy Threshold - Excellent
95
Accuracy Threshold - Good
85
Auto-Run Plan Schedules
Clamp Auto Forecast Load
DER Generation Display Precision
2
DER Generation Units
Expanded Hierarchy Levels
2
Least Squares Filtering
Least Squares Filtering Max Error
0.5
Least Squares Filtering Minimum Data Points
2500
Load Display Precision
2
Load Growth
Load Units
Max Previous Days
2000
Outlier Band
1.5
Percentage Display Precision
2
Smoothing
Cubic
Solar Generation Display Precision
2
Solar Generation Units
Wind Generation Display Precision
2
Wind Generation Units

| Field | Description | Allowed Values | Default Value |
|---|---|---|---|
| Accuracy Display Precision | Number the of places past the decimal for displaying accuracies | Non-negative Integer | 2 |
| Accuracy Threshold – Excellent | Forecasted load values whose accuracy is at least the configured value will be colored green | Number between 0 and 100 | 95 |
| Accuracy Threshold – Good | Forecasted load values whose accuracy is between the configured value and the Accuracy Threshold—Excellent value will be colored orange. Load values below this threshold will be colored red. | Number between 0 and 100 | 85 |
| Auto-Run Plan Schedules | Whether to automatically re-run a plan schedule when a planned forecast is re-run | Checked/unchecked | Unchecked |
| Clamp Auto Forecast Load | Whether to force forecasted load values to be within the area defined minimum load and maximum load values | Checked/unchecked | Unchecked |
| DER Generation Display Precision | Number the of places past the decimal for displaying DER generation | Non-negative Integer | 2 |
| DER Generation Units | The units to use when displaying DER generation | Text | Empty |
| Expanded Hierarchy Levels | The number of hierarchy layers to view when opening up the area tree navigation panel | Positive integer | 2 |
| Least Squares Filtering | Whether to filter historical data from being used in the algorithms based on how closely their weather parameters match the forecast values. | Checked/unchecked | Checked |
| Load Growth | Whether to try to model a linear load growth based on time | Checked/unchecked | Checked |
| Least Squares Filtering Max Error | Maximum error to allow through least squares filtering | Positive decimal value | 0.5 |
| Least Squares Filtering Minimum Data Points | Minimum number of data points to let through least squares filtering | Positive integer value | 2500 |
| Load Display Precision | How many decimal places to show when displaying load values. | Non-negative Integer | 2 |
| Load Units | The units that the load values have | Text | N/A |
| Max Previous Days | The maximum number of days in the past to use in the algorithms | Positive Integer | 2000 |
| Outlier Band | **Forecast** uses this to filter the historical data used in the algorithms by multiplying the interquartile range of the historical load by the configured value and filtering data whose load values lie outside this range. If you want to not filter any historical data this way, increase the value to upwards of 10. The default of 1.5 is a median between removing outliers and having enough variance in the data. | Positive decimal value | 1.5 |

| Field | Description | Allowed Values | Default Value |
|---|---|---|---|
| Percentage Display Precision | The number of decimal places show display when displaying percent accuracy/error values | Positive integer | 2 |
| Smoothing | Select the Savitsky-Golay filtering method. | Drop-down | Cubic |
| Solar Generation Precision | Number the of places past the decimal for displaying solar generation | Non-negative Integer | 2 |
| Solar Generation Units | The units that the solar generation values have | Text | N/A |
| Wind Generation Precision | Number the of places past the decimal for displaying wind generation | Non-negative Integer | 2 |
| Wind Generation Units | The units that the wind generation values have | Text | N/A |

## 6.4 OpenHIS Import Settings




| Field | Description | Allowed Values | Default Value |
|---|---|---|---|
| OpenHIS Data Type | The **OpenHIS** data type number for the data you want to import. See the **OpenHIS** documentation for more information on data types. | Positive integer | 1 |
| OpenHIS Period Code | The periodicity in **OpenHIS**, which indicates how often the data is archived | Positive integer | 6 |
| OpenHIS Table Prefix | The prefix for the history tables where historical load and weather data live in the **OpenHIS** database. | Text | DATA_VALUES_ |

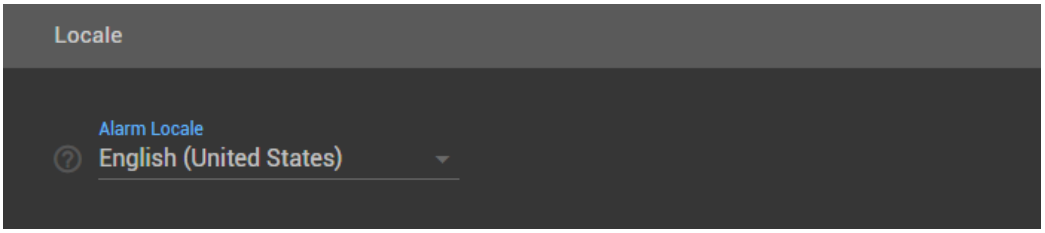
## 6.5 Notification Settings

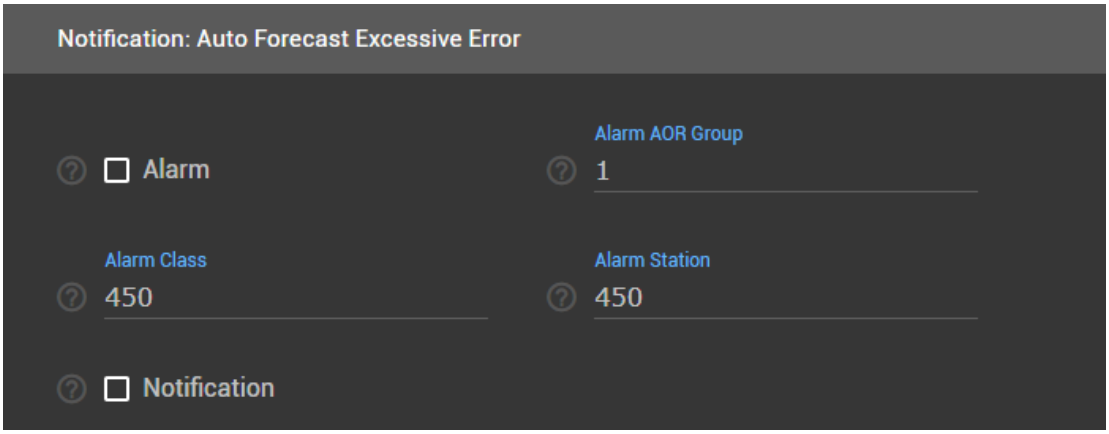
You can have **Forecast** generate notifications and/or system alarms when certain scenarios occur, including:

- An auto forecast is generating excessive errors

- The load of an auto forecast exceeds it limits
- An auto forecast is missing data
- Real-time data has a bad quality
- Real-time data is out of date (stale)

The fields for configuring notifications for each of these are the same.



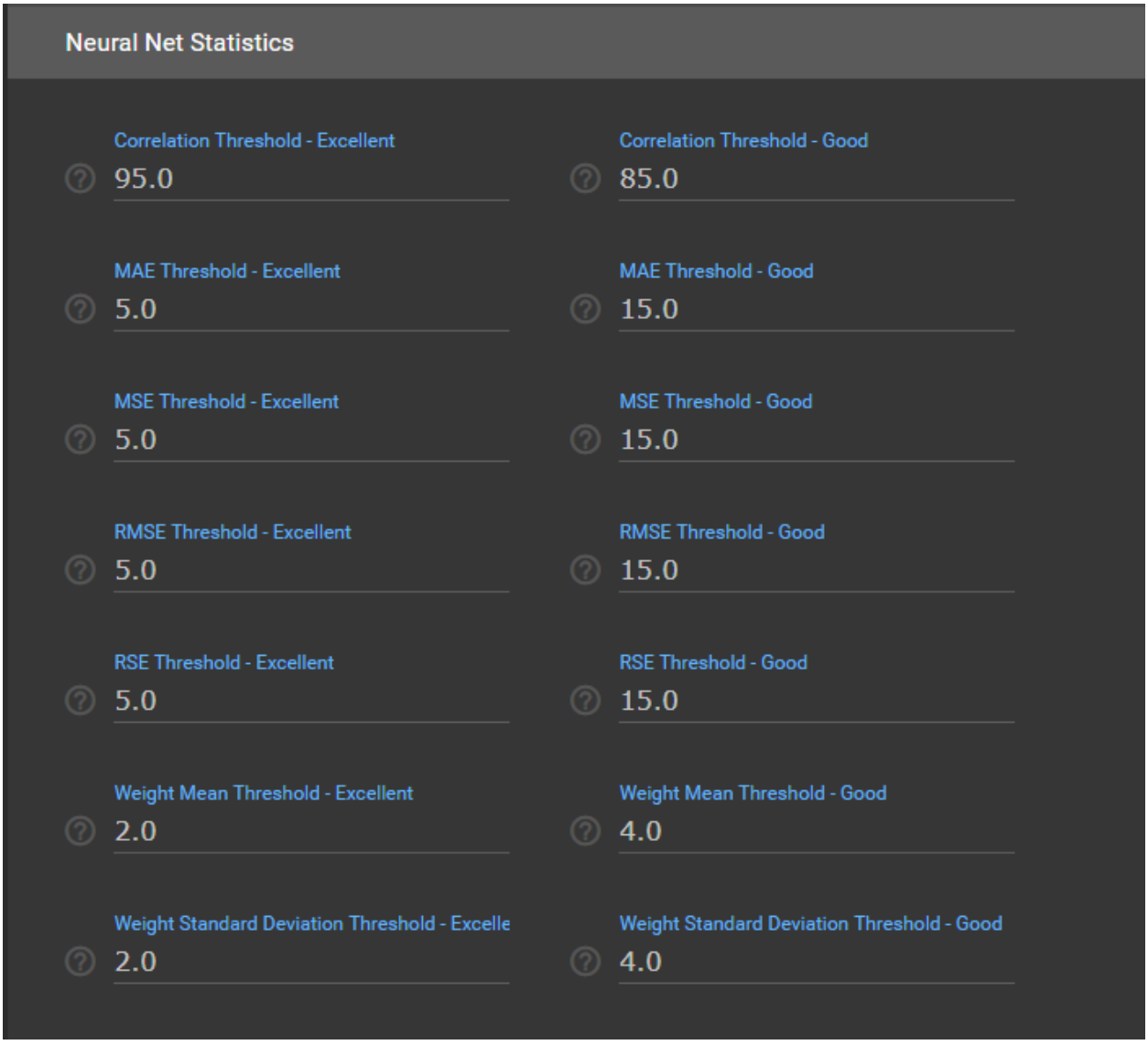




| Field | Description | Allowed Values |
|---|---|---|
| Alarm Locale | The locale to use when generating an alarm | Language locale |
| Alarm | If checked, alarms for the selected scenario will be generated in the **monarch**™ system | Checked/unchecked |
| Alarm AOR Group | The AOR group to use for the generated alarm | Non-negative Integer |
| Alarm Class | The class to use for the generated alarm | Non-negative Integer |
| Alarm Station | The station to use for the generated alarm | Non-negative Integer |
| Band (Plan Schedule Missing Value only) | How long in days to check for a missing value in a plan schedule | Non-negative Integer |
| Notification | If checked, alarms for the selected scenario will generate a notification in **Web Platform** | Checked/unchecked |

## 6.6 Neural Net Statistics

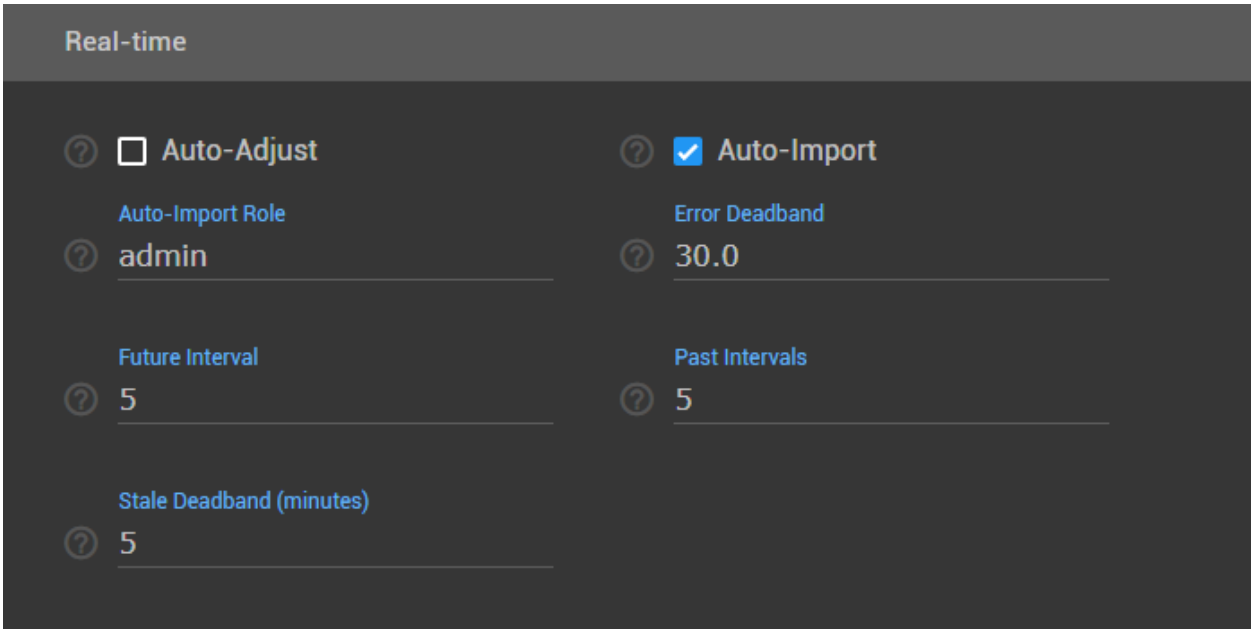
Neural network training statistics can be viewed after training a neural network. The ranges where each of these statistics is considered acceptable can be configured in the following settings. The provided statistics are as follows.

- MSE (Mean Squared Error) – Error metric that is weighted by the higher error values
- MAE (Mean Absolute Error) – Error metric that is less affected by higher error values
- RMSE (Root Mean Squared Error) – Tries to normalize Mean Squared Error
- RSE (Relative Squared Error) – Compares the results to the original data rather than the trained data
- Correlation – How closely the network's outputs match the trend of the data.



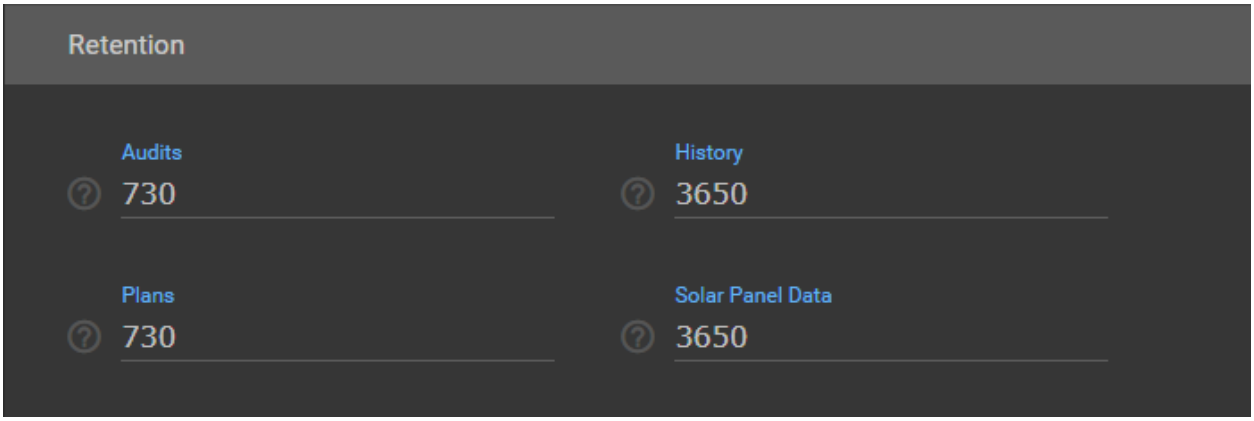
| Field | Description | Allowed Values | Default Value |
|---|---|---|---|
| Correlation Threshold - Excellent | Correlation values at least at the configured value will be colored green | Positive decimal number | 95.0 |
| Correlation Threshold - Good | Correlation values between the configured value and the Correlation Threshold—Excellent value will be colored orange. Values below this threshold will be colored red. | Positive decimal number | 85.0 |
| MAE Threshold - Excellent | MAE values at most the configured value will be colored green | Positive decimal number | 5.0 |
| MAE Threshold - Good | MAE values between the configured value and the MAE Threshold—Excellent value will be colored orange. Values above this threshold will be colored red. | Positive decimal number | 15.0 |
| MSE Threshold - Excellent | MSE values at most the configured value will be colored green | Positive decimal number | 5.0 |
| MSE Threshold - Good | MSE values between the configured value and the MSE Threshold—Excellent value will be colored orange. Values above this threshold will be colored red. | Positive decimal number | 15.0 |
| RMSE Threshold - Excellent | RMSE values at most the configured value will be colored green | Positive decimal number | 5.0 |
| RMSE Threshold - Good | RMSE values between the configured value and the RMSE Threshold—Excellent value will be colored orange. Values above this threshold will be colored red. | Positive decimal number | 15.0 |
| RSE Threshold - Excellent | RSE values at most the configured value will be colored green | Positive decimal number | 5.0 |
| RSE Threshold - Good | RSE values between the configured value and the RSE Threshold—Excellent value will be colored orange. Values above this threshold will be colored red. | Positive decimal number | 15.0 |
| Weight Mean Threshold - Excellent | Weight mean values at most the configured value will be colored green | Positive decimal number | 2.0 |
| Weight Mean Threshold - Good | Weight mean values between the configured value and the RSE Threshold—Excellent value will be colored orange. Values above this threshold will be colored red. | Positive decimal number | 4.0 |
| Weight Standard Deviation Threshold - Excellent | Weight standard deviation values at most the configured value will be colored green | Positive decimal number | 2.0 |
| Weight Standard Deviation Threshold - Good | Weight standard deviation values between the configured value and the RSE Threshold—Excellent value will be colored orange. Values above this threshold will be colored red. | Positive decimal number | 4.0 |

## 6.7 Real-Time Data Import Settings



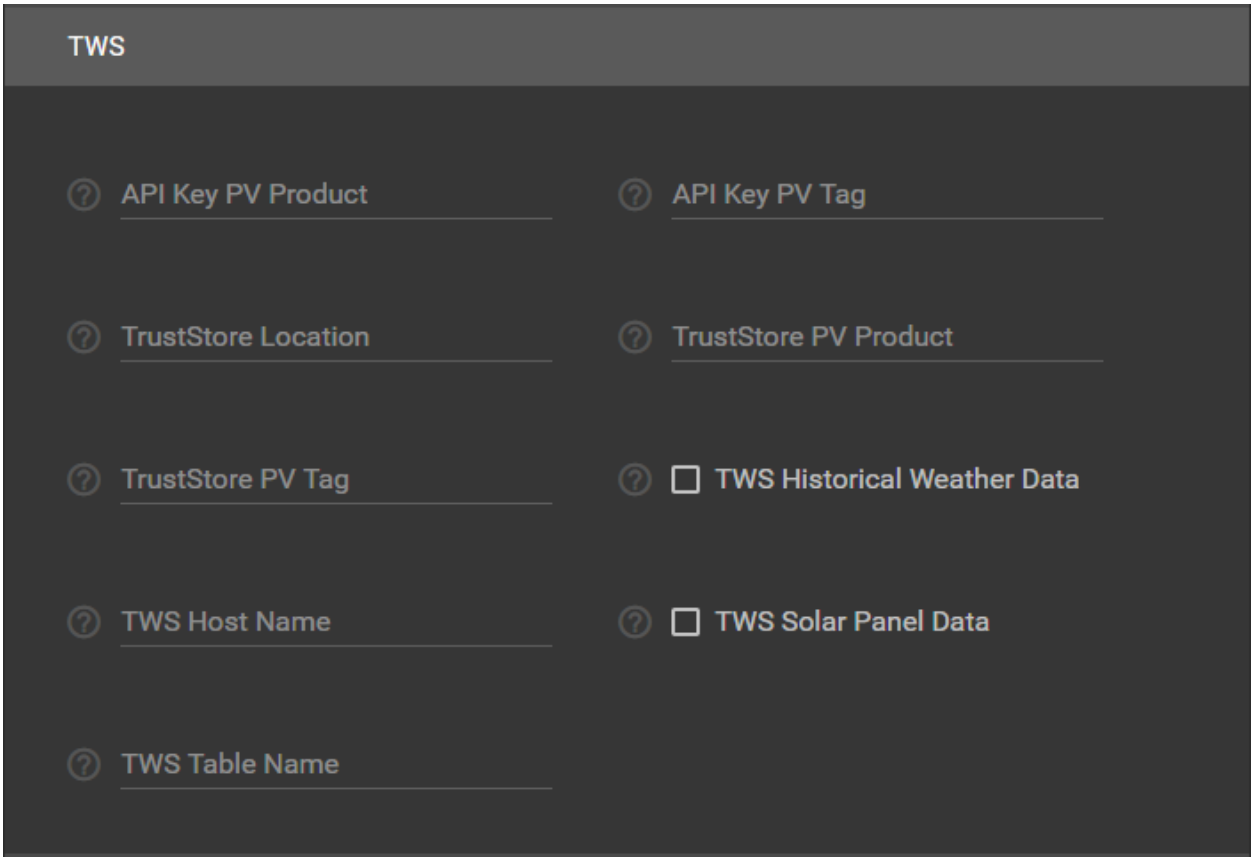

| Field | Description | Allowed Values | Default Value |
|---|---|---|---|
| Auto-Adjust | If checked, future planned load values will be adjusted based on the performance of past planned load values. | Checked/unchecked | Unchecked |
| Auto-Import | Whether to enable periodic sampling and importing of data in **OpenSCADA** into **Forecast's** database. | Checked/unchecked | Unchecked |
| Auto-Import Role | The user used to connect to **OpenSCADA** and import real-time data. The configured value must be in Password Vault with the same name, with the Password Vault product being "webplatform." The tag must be "Role_##" where ## lies between 01-10 inclusive. | Text | N/A |
| Future Interval | The number of future intervals to adjust | 0 to 100 | 5 |
| Error Deadband | If Auto-Adjust is enabled, while adjusting **Forecast** will check the error percent of past planned loads against the real-time values. If they exceed the configured amount, **Forecast** will issue a warning indicating such. | Positive decimal number | 30 |
| Past Intervals | The number of past intervals to evaluate when doing real-time adjustment work | Positive integer | 5 |
| Stale Deadband (minutes) | How many minutes must pass without an update until a real-time sample is considered stale | 1 to 60 minutes | 5 |

## 6.8 Data Retention Settings




| Field | Description | Allowed Values | Default Value |
|---|---|---|---|
| Audits | Audit data older than the specified number of days will be periodically deleted | Positive integer | 730 |
| History | Historical data older than the specified number of days will be periodically deleted | Positive integer | 3650 |
| Plans | Planned forecast data older specified number of days will be periodically deleted | Positive integer | 730 |
| Solar Panel Data | Solar panel data older specified number of days will be periodically deleted | Positive integer | 3650 |

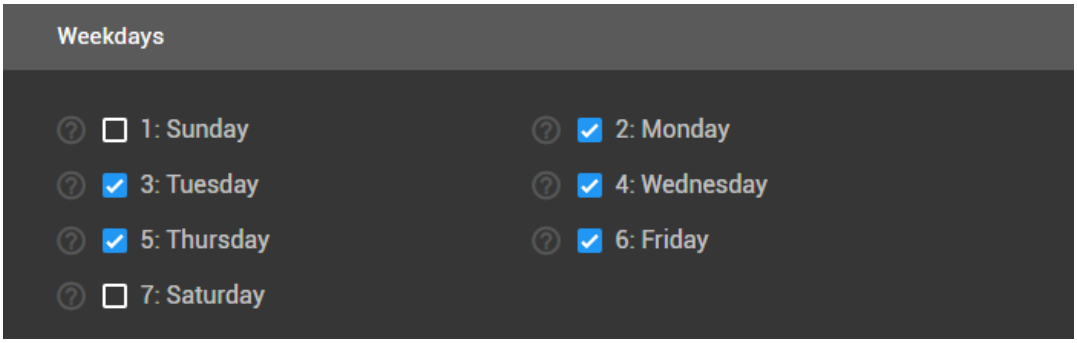
## 6.9 TWS




| Field | Description | Allowed Values | Default Value |
|---|---|---|---|
| API Key PV Product | Password vault product for the API key | Test | Blank |
| API Key PV Tag | Password vault tag for the API key | Test | Blank |
| TrustStore Location | Location of the truststore (can use ${OSI} and ${JOB}) | Test | Blank |
| TrustStore PV Product | Password vault product for the truststore | Test | Blank |
| TrustStore PV Tag | Password vault tag for the truststore | Test | Blank |
| TWS Historical Weather Data | Specify whether to use TWS historical weather data | Checked/unchecked | Unchecked |
| TWS Host Name | Host name to use while connecting to TWS | Text | Blank |
| TWS Solar Panel Data | Specify whether to use TWS solar panel data | Checked/unchecked | Unchecked |
| TWS Table Name | Name of the table in TWS to pull data from | Text | Blank |

## 6.10 Weekday vs Weekend Days

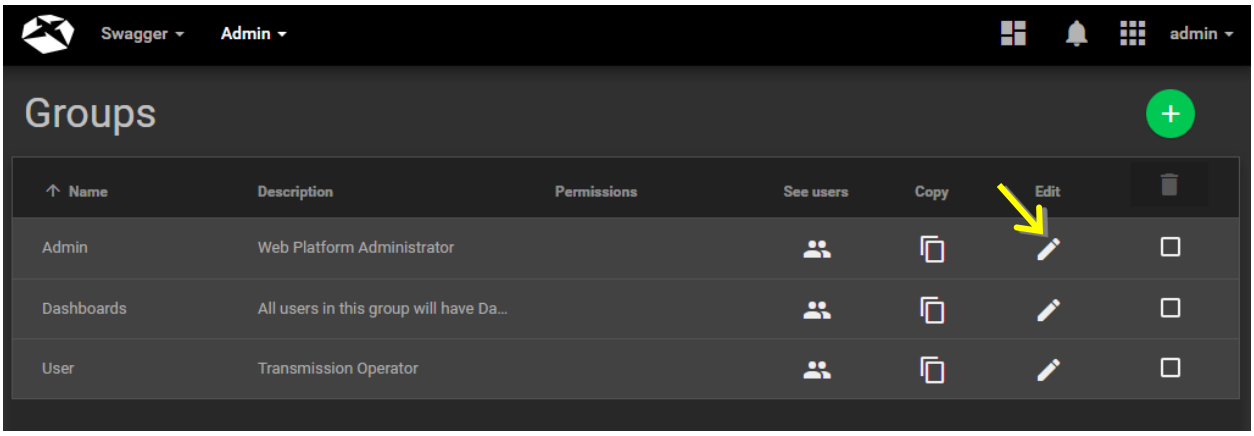
In the Weekdays section, check the boxes for the days that you want **Forecast** to consider weekdays. Unchecked boxes will be considered weekend days.



# Chapter 7 Forecast Permissions

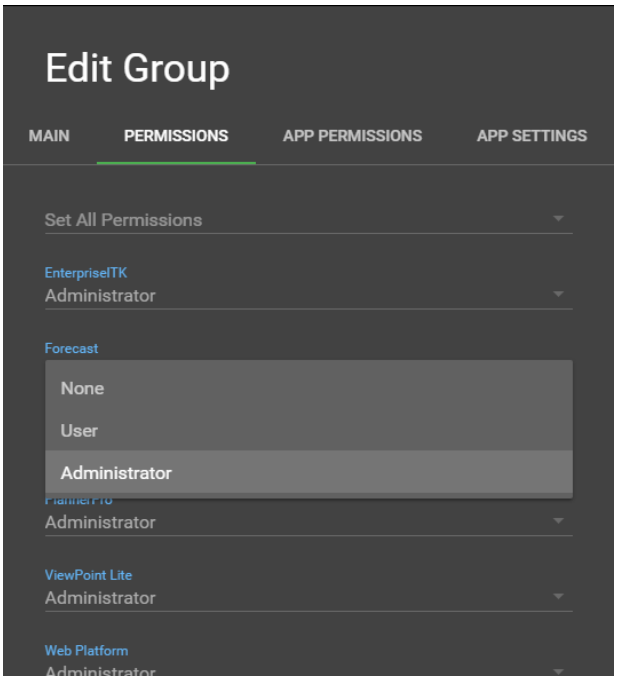
NOTE These instructions are for **Web Platform** version 2. If you have **Web Platform** version 3, then you can also set permissions on a per-console basis. If console and user group permissions are in conflict for any area, **Forecast** will obey the more-restrictive setting.

Permissions for **Forecast** are configured in **Web Platform**. Click on **Admin → Groups**, and click on the pencil icon for a group to edit settings for that group.



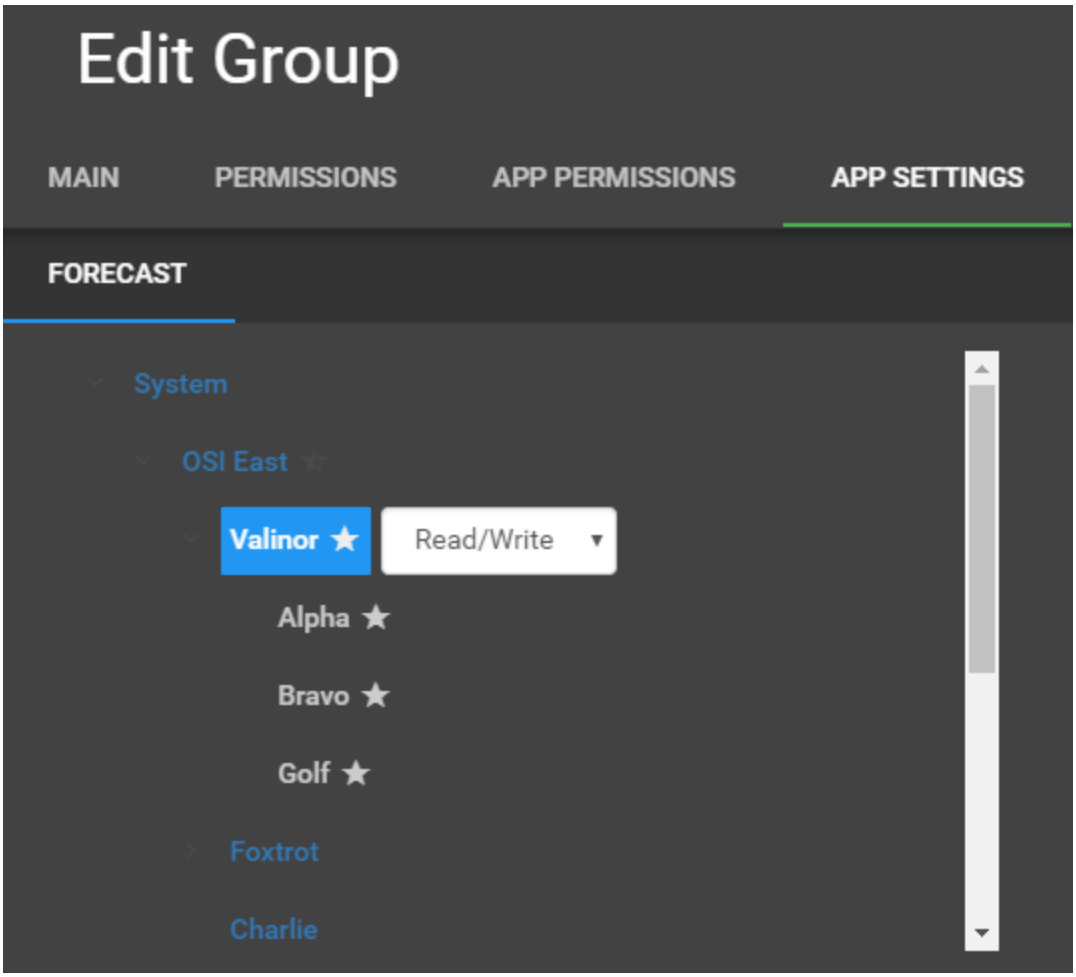

On the Permissions tab, you can set user group permissions for each **Web Platform** application. **Forecast** has three levels of permission for users:

- None – Group members have no access to **Forecast**.
- User – Group members have area read and write permissions as defined on the App Settings tab, and do not have access to the Admin menu in **Forecast**.
- Administrator – Group members have read and write permissions to all areas in **Forecast**, and have access to the Admin menu in **Forecast**.




On the App Settings tab, you can set per-area access permissions for **Forecast**. Group permissions for a given area can be set to one of the three options:

- None – Group members have no access to this area.
- Read – Group members can view data in the area, but may not create new forecasts, plan schedules, create new neural networks and so on. This setting is not inherited by sub-areas.
- Read/Write – Group members can view data for the area as well as create new forecasts, plan schedules, create new neural networks and so on. This setting is inherited by sub-areas (for example, in the screenshot below, the Valinor area is set to read/write, so all of its sub-areas inherit the setting and are greyed out).


Edit Group
MAIN
PERMISSIONS
APP PERMISSIONS
APP SETTINGS
FORECAST
System
OSI East
Valinor
Read/Write
Alpha
Bravo
Golf
Foxtrot
Charlie

# Revision History

| Date of Change | Rev. # | Details of Change | Author | Approval |
|---|---|---|---|---|
| 31MAR17 | 1.0 | Initial creation | A. Stewart | A. Halimah |
| 04JAN18 | 2.0 | Updates for version 2.0.0.0 | G. Line | S. Agarwal |
| 04JUN18 | 2.1 | Updates for version 2.1.0.0 | G. Line | S. Agarwal |
| 28MAR19 | 2.2 | Added chapter about permissions configured in Web Platform; added TWS import; expanded DERMS functionality; updated screenshots and system settings for 2.2.2.0. | A. Slepak | S. Agarwal |
| | | | | |
| | | | | |
| | | | | |